DOCUMENT RESUME

ED 060 966 24 PS 005 603

AUTHOR Blaut, J. M.
TITLE Studies of Place Perception in Elementary and Pre-School Education. Vol. I. Final Report.
INSTITUTION Clark Univ., Worcester, Mass.
SPONS AGENCY Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO BR-8-0772
PUB DATE Sep 71
GRANT OEG-0-8-080772-4493(010)
NOTE 68p.; Volume I of III; Vols. II and III are supplementary documents. Vol. I will be published as "Place Perception Research Report No. 9"

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Age Differences; Behavior Patterns; Cognitive Development; Concept Formation; Cross Cultural Studies; Curriculum Development; *Elementary Education; Environment; Geography; Instructional Materials; *Learning; Learning Theories; Linguistics; *Map Skills; Models; *Perceptual Development; *Preschool Education; Publications; Research Methodology; Research Projects; Social Sciences; Space Orientation

ABSTRACT

A research project of environmental learning in children is discussed. Most of the studies conducted during the research involved observation of children aged 3-12, in mapping and free environmental behavior, and in curricular experiments using perceptual surrogates for map-learning and macro-environmental conceptualization in the lower elementary grades. Other studies deal with topics related to the central problem of place perception, cognition, and cathexis and the need for data and theory which will assist in reforming macro environmental education in geography, social science, and elsewhere. Topics include psychophysics of map and color perception, unschooled environmental learning in peasant communities, epistemological assumptions (and their origins) underlying macro-spatial teaching, cognitive-cathectic beliefs found in textbooks and analyzed ethnogeographically, and the logical-linguistic-iconic structure of the map language. The main finding has been that mapping behavior is so highly developed before school-entering age that formal map skills and theoretical concepts in geography, social science, etc., are easily and eagerly grasped. A general model of environmental learning has resulted in a curriculum model that is now being tested in three states and Puerto Rico. The Contents of Volume II, Place Perception Research Reports, and of Volume III, Publications, Manuscript Reports and Perceptual Surrogages: Cumulative Files are given. (Author/DB)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

PA-24
BR-8-0772

Final Report

Project No. 8-0772
Grant No. OEG-0-8-080772-4493(010)

Vol. I

ED 060966

Studies of Place Perception

in Elementary and Pre-School Eduaation

J. M. Blaut
Clark University
Worcester, Mass. 01610

September, 1971

The research reported herein was performed pursuant to a grant from the Office of Education, U. S. Department of Health, Education, and Welfare, and funds from other sources. Contractors undertaking such project under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions do not, therefore, necessarily represent official Office of Education position or policy.

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Eduaation
Bureau of Research

* * * * * * * * * * * * * * * * *

THIS REPORT IS ACCOMPANIED BY TWO SUPPLEMENTARY VOLUMES:

Vol. II. Place Perception Research Reports

Vol. III. Place Perception Project Publications, Manuscript Reports, and Perceptual Surrogates

PS 005603

This Final Report of the Place Perception Project was prepared by J. M. Blaut on behalf of the Co-Directors of the project: David Stea, G. F. McCleary, Jr., and J. M. Blaut. This report will be published as Place Perception Research Report No. 9. Volumes II and III are supplementary documents, not portions of the report itself.

TABLE OF CONTENTS

Section	Page
VOLUME I	
Table of Contents	5
List of Figures	6
Preface	7
Acknowledgements	9
Introduction: A Reader's Guide to the Report	10
Summary	12
Aims of the Project	13
Methods	19
Results	22
Themes	23
Completed Projects	25
Completed Pilot Studies	32
Projects in Progress	36
Other Project Results	38
Conclusions and Applications	39
Summary of Findings	39
Dissemination and Application of Findings	44
FIGURES	49
APPENDICES	57
1. Bibliography of Project Publications and Reports	57
A. Completed Materials	57
B. Materials in Progress	62
2. List of Participants	64
3. List of Cooperating Schools and School Systems	66
4. Evaluation of Aircraft	67
5. Letter from National Council for Geographic Education	68
6. Contents of Volume II: Place Perception Research Reports	69
7. Contents of Volume III: File of Publications and Reports	70

VOLUME II

PLACE PERCEPTION RESEARCH REPORTS

VOLUME III

PUBLICATIONS, REPORTS, AND PERCEPTUAL SURROGATES: CUMULATIVE FILE

PS 005603

LIST OF FIGURES

Figure		Page
1.	Aerial photograph of part of Worcester, Massachusetts, used in third-grade curriculum project	50
2.	Sketch map of the activity space of pre-school children in a rural household, St. Vincent	51
3.	Base map for the age-specific land-use map of Barranquitas, Puerto Rico	52
4.	Sketch of a wheeled toy from the St. Vincent toy inventory	53
5.	Graph of scores from the toy-play test of cognitive mapping abilities among three-to five-year-old children, Massachusetts	54
6.	Map employed in first-grade map-learning curriculum, Boylston, Massachusetts	55
7.	Examples of environmental toy-play patterns created by Puerto Rican kindergarten children	56

The captions and descriptions for all figures will be found on page 49.

PREFACE

This final Report of the Place Perception Project is a relatively brief document, intended mainly to survey the work carried out from 1968 to 1971 under our Office of Education grant and to indicate the uses to which the results of the project are now being put in new educational approaches and new directions for research. Those who wish to glean from this report the actual substance and product of our work ar urged to turn immediately to the Appendices; It is here one finds a list of the many technical papers which have been published, accepted for publication, and submitted for publication, along with the eight volumes thus far completed in our Place Perception Research series.Next, the reader who is concerned with our findings should turn to the "Results", "Conclusions," and--most important of all for those of our readers who are practicing educators: we hope the majority--"Applications", for it is here that we discuss our work in progress.

Work is indeed in progress. The pace and scope and practical applications of the Place Perception Project are in fact increasing. A full report of current lines of progress will be found at a later point in this report, but here are some examples:

--Six more Place Perception Research Reports are in various stages of editing,and eight more technical articles are underway.

--Two books on the project, J. M. Blaut and David Stea, Environmental Learning (Aldine-Atherton, probably 1972) and Roger Hart, J. M. Blaut, and David Stea, Environmental Imagery in Elementary Education: A Teachers Manual, are in preparation; two other books edited by David Stea and Roger Downs, Cognitive Mapping: Images of Man's Spatial Environment, Aldine-Atherton, probably 1972) and Imagery and Environmental Cognition, (probably Pion, Ltd.) are secondary outgrowths of the project, in part.

--Although one of the three original investigators, G. F. McCleary, Jr., has left our research team, several major figures in education and science have joined us in forming a non-profit research organization, the Environmental Research Group. This non-profit organization is a lineal descendent of the Place Perception Project and is continuing the project's Place Perception Research reports; reports numbered six and above bear the imprimatur of ERG, not Clark University. William Pattison in geographic education, Daniel Carson in psychology and man-environment system, and Howard Stanton is sociology and social planning are among the directors of ERG, along with Stea and Blaut from PPP.

--Last but most important, the educational application of our 1968-71 research is already to be seen in California (Santa Monica system), Massachusetts (Worcester system), and Vermont and Puerto Rico, while a major curriculum and imagery program for the Puerto Rican system has been started at the University of Puerto Rico and may shortly extend to all the schools of the island.

When we began the Place Perception Project, we predicted its future with a fair measure of accuracy. We stated, first of all, that our work during the two-year (later three-year) life of the Grant would be limited in general to research, one portion of which would be basic and even somewhat esoteric, while the other portion would be applied research conducted in and for the schools. We went on to predict (on page 15 of the Grant proposal) that our applied research would begin to have an innovative impact on educational practice during the period of the grant itself, while our pure research during the grant period would spawn a second generation of applied research and educational innovation when the findings emerged at the end of the period. This is precisely what has happened. In 1968 we were testing the ability of six-year-olds to read aerial photographs; by 1970 we had designed a first-grade map-learning curriculum and a third-grade geography curriculum based on the 1968 work; and by 1972 we expect to see this form of imagery in widespread use--it already is in at least four systems, and we understand that a new crop of elementary texts incorporating some of these findings is already in press.

At the other end of the spectrum, our abstract analysis of mapping as a linguistic system in the 1968-70 period led us to the hypothesis--at that time startling--that children as young as three would be able tc work with this language, and they can; most recently, the analysis has led us to initiate a study of reading as one-dimensional mapping, with obvious areas of application. And in general, each of the two phases of the Place Perception Project has apawned an offspring: The Environmental Research Group for non-profit applied studies, and development, and a series of new research programs at U.C.L.A., Penn State, the University of Illinois Chicago Circle, and the University of Puerto Rico for promising lines of theory about environmental learning and cognition.

We account this success.

ACKNOWLEDGEMENTS

When research is undertaken at a university and particularly when several dozen students work on a project for love in lieu of money, while several times that number write term papers and do special studies for credit (and perhaps a little love as well)--under these conditions it is flatly impossible to decide whose assistance to acknowledge: our list, to be complete, would contain well over a hundred names of collaborators at Clark alone. It is impossible, for similar reasons, to acknowledge the invaluable assistance of several dozen cooperating teachers and supervisors in Massachusetts, Puerto Rico, St. Vincent, and elsewhere. So, with apologies to many, we will mention by name only those who have worked with the project over lengthy periods of time and those who have contributed substantial creative ideas.

Ann Bates-Gee was and is the backbone of the project. The contribution of Roger Hart was fully as a substantial as that of a co-director. Among many others who contributed in innumerable ways, we should mention at least the following: Jeremy Anderson, Zaida Berrios, Meca Blaut, Jill Bloom, Cynthia Briggs, Dan Carson, Borden Dent, the Joiles Family, Deborah Kasnitz, Gregory Knight, Ann Lewis, Mark Lynch, Leonard Mark, Irene Mauro, Maureen McGee, Gary Moore, Merrie Muir, Tom Nickerson, Roberta Norin, William Pattison, Thorne Shipley, Howard Stanton, Margaret Tyndall, David Weaver, Robert Wesner, Ben Wisner, Denis Wood, and Chuck Zerner.

But most important: several thousand exciting and excited children, including two-year-old Larito, who saw things in a picture, and five-year-old Backus, who lent us a cutlass.

* * * *

A list of those who participated in the project is given below in the appendices. We acknowledge their help, too, with gratitude.

INTRODUCTION: A READER'S GUIDE TO THE REPORT

The major aim of this report is to display the accomplishments of the Place Perception Project during the three years of generous grant support from the Office of Education. The aim is best served, we believe, by summarizing the project's activities and accomplishments in very brief form and attaching as appendices our publications, Research Reports, and other writings, most of them in full; the remainder -- cases where the text is not available or not yet polished -- with an abstract and citation. Although by no means all of the work of this project has consisted of research culminating in a technical document or publication, yet the Place Perception Project is in fact charged primarily with the duty of carrying out basic and applied research -- we are hardly comparable to a curriculum or training program, for instance -- and our major contribution resides in the two or three dozen publications, manuscript article, and Research Reports attached hereto. Shortly we hope to complete a 400-pages book about the project as a whole (Environmental Learning: Aldine-Atherton, probably 1972), but, lacking that major descriptive manuscript, we chose not to summarize our research in a moderate-sized narrative document but rather to present it in full, appended to this brief report.

The report will therefore say very little about the substance of this project's research. It will concentrate instead on practical aspects of the project and on the statements in which, respectively, overall aims and conclusions, theoretical and practical, are gathered from all work performed over the past three years, and --most importantly-- the statement embodying our recommendations for reform of macro-environmental education at the elementary level-- reform in the teaching of geography, history, and macroscopic concepts of social and natural science. In the perfectly common instance where a third-grade child, we say, is given no overall understanding of the integrative processes binding his own community and no visual image of the community, we should really not speak of reforming macro-environmental education, but of initiating it. Initiation, reform, and improvement in this multidisciplinary dimension of elementary and pre-school education which is called forth by such words as scale, scope, place, space, milieu, and macro-environment has been the essential goal of each aspect of our work, whether basic or applied --that is, whether applied next year or a few years later.

Following the general statement of aims, immediately below, will come a brief summary of the major categories of methodology used in the project

-- exceedingly brief since the methods used in a given project are to be found in the report or publication dealing with the project itself. One major exception is, of course, our work in progress, but there is little point in reporting methods in a case where one cannot report results. The other major exception is our program of research on the pre-school role of toy-play in environmental learning and certain general cognitive learning processes involving the aggregation of parts into wholes; this program began to bear fruit quite recently, the Place Perception Research Report describing it (No. 10) is not finished, and the only paper completed thus far is very short ("A Toy Plan of Cognitive Mapping in the Three-To-Five-Year-Old Children," A "Brief Report" for Developmental Psychology). Therefore, somewhat more attention is devoted to the methodology of the discussion of the toy-play work that to any other.

The section below entitled "Results" is long but uninformative. First we provide a short description of the general aims and findings for each of the nine "themes" into which our work is divided. Then we give an even shorter description for each of the many specific project and pilot projects which have been undertaken. Finally, we mention the programs of dissemination and application along with miscellaneous PPP accomplishments. Following all this are the two serious statements dealing respectively with our conclusions and our recommendations, and lastly the appendices: lists of cooperating schools and project personnel followed by a long bibliography and publications, manuscript reports, and Place Perception Research reports.

SUMMARY

History: The Place Perception Project began in 1966 at Clark University as a small-scale study of environmental learning in children. A generous grant was made to the project by the U.S. Office of Education in 1968, permitting an expansion into eight major areas of pure and applied research which appeared to hold promise for the improvement of environmental education in young children. Between 1968 and 1971, a number of research and demonstration projects were carried out in six of the eight original fields and in several new ones which gained in importance as the work proceeded. After the grant expired in 1971 the Place Perception Project became the Environmental Research Group, a non-profit organization which will coordinate the future research and development program of a project that functions now at six universities and countless schools from California to Puerto Rico, aiming to generate basic improvements in environmental education and other aspects of environmental use, principally in children.

Personnel and Activities: David Stea, G. F. McCleary, Jr., and J. M. Blaut (principal investigator) were the co-directors of the project through June, 1971; in its new phase, Stea and Blaut are co-directors, while other directors of ERG (experts in geography, education, and psychology) serve as consultants. Research personnel during the PPP phase included two research associates (Roger Hart and Borden Dent), 31 research assistants (14 graduate students, 13 undergraduates, 4 others), an editor-administrator (Ann Bates-Gee), and consultants in geography, education, and psychology. Research and demonstration work has been carried out mainly in Massachusetts, Vermont, Pennsylvania, California, Puerto Rico, and (with other funding) St. Vincent, Venezuela, and Kenya. Most studies involve observation of children aged 3-12, in mapping (with toys, air photos, etc.) and free environmental behavior, and in curricular experiments using perceptual surrogates for map-learning and macro-environmental conceptualization in the lower elementary grades. Other studies deal with diverse topics related to the central problem of place perception, cognition, and cathexis and the need for data and theory which will assist in reforming macro-environmental education in geography, social science, and elsewhere. Topics include psychophysics of map and color perception, unschooled environmental learning in peasant communities, epistemological assumptions (and their origins) underlying macro-spatial teaching, cognitive-cathectic beliefs found in textbooks and analyzed ethnogeographically, and the logical-linguistic-iconic structure of the map language.

Results and Applications: The main finding has been that mapping behavior is so highly developed before school-entering age that formal map skills and theoretical concepts in geography, social science, etc., are easily and eagerly grasped. A general model of environmental learning has now spawned a curriculum model, now being tested in Mass., Vt. Calif., and Puerto Rico.

AIMS OF THE PROJECT

A five-year-old is an intrepid explorer, moving with confidence through a large and unfamiliar environment. How does he learn to do it? We argue in the Place Perception Project that learning about an environment, or place, poses very different problems for the child than learning about a small object or a person.

Some of the differences are fairly obvious: place-learning generally uses fewer sensory modalities--principally the eyes and feet-- and has its own form of cathexis: a place may be nice, or secret, or spooky, but rarely is it furry, or tasty, or angry. Even more obvious are some specific differences between the two situational dyads, place/object and place/person. Objects are accessible to all the sense modalities; they are observed from all angles; they are learned in large part through handling. Environments are perceived mainly with the exteroceptors; they are seen from relatively few vantages and angles; they are traversed, not handled, and many of their regions, to a five-year-old, are merely distant scenes, learned as well by thought or imagination as by vision. Persons, in turn, are rather hard to confuse with environments. Mother is samaller than a place. Mother acts; a place remains inert. And so on through a long list of differences which are painfully obvious but not at all trivial.

Environmental learning, in brief, is a special and distinctive task for the young child and he seems to know so better than we do. We do not instruct him in closed-traverse surveying yet he finds his way home nonetheless. Nor do we reward him for wandering as we do for correct comportment and precocious use of tools. It is by no means irrelevant to point out that his ancestors and ours were working out pathway and detour problems long before they began to handle tools or say thank you.

This point leads us to what may be the central issue for our project: the reason why environmental learning has had so little attention from psychologists, educators, and geographers after the days of Froebel, Pestalozzi, and Ritter. On the one hand, place-learning is usually studied in rats, not men, unless the place is a phone-booth-sized experimental enclosure -- hence almost as much an object as a space. On

the other hand, the object itself is ordinarily used in psychological research as though its physical, micro-environmental nature were irrelevant: it may be a prop in group activity, or a person displaced, or a medium to convey some message, or merely a Ding an Sich for observations of behavior. As a general rule, the material object is viewed in Western psychology, philosophy, and social science as little more than the external circuitry of social interaction, or merely as an extension of man himself: prosthesis, sign vehicle, or ego extension.

But macro-environments, or places, are noticed even less than micro-environments, or things. For example: An odd-shaped table may influence a particular social process, a conference, and hence be studied by "ecological" psychologists; but the room, the building, the smog-filled city, the war-torn country are easily ignored. The world of objects is incorporated into psychological and social theory -- and educational practice -- to the extent that objects are seen as extensions of the self or as social props and media. But larger places, macro-environments, are clumsy in these roles. The Mojave is hardly a prop. No ego would want to encompass Lake Erie. The Jersey Meadows are anything but prosthetic. One should add that Western infatuation with hand-manipulated tools (including cars) must aggravate the tendency to substitute an object for a place, a symbol for an object. Highway-places are built for automobile-objects and these as symbols for social esteem. Small wonder that environmental learning is ignored by the theorist and curriculum-designer, though not by the five-year-old child.

Environmental learning is thus distinct from other modes in a number of obvious ways. If we list these obvious distinctions, let alone others, we find that they seem to fit together like pieces of a jigsaw puzzle, hinting at an overall pattern: a model of environmental learning in general. If the model is essentially correct, then each of the remaining, less-than-obvious attributes will fit a predicted slot in the jigsaw puzzle and the pattern will gradually take shape as a theory. Such a theory seems to be emerging from our research, though it spawns new problems as fast as the old ones are solved.

The basic model of place-learning in children was developed shortly after the Place Perception Project began three years ago. The model was at first heuristic and general; merely a guide in our choice of experiments. But we soon found that the model had two very different segments, one of which evolved into a sharp and testable set of propositions. These latter dealt with the role of cognitive ("mental") mapping in environmental learning and anticipatory behavior. A sizeable number of studies was carried out to determine the properties of

cognitive mapping behavior in children between the ages of five and ten. We rapidly came to understand the process well enough to evolve some fruitful applications, including a fairly sophisticated map-learning unit based on aerial photos that was used successfully with first-graders; an equally successful third-grade geography unit in Massachusetts that covered fairly advanced geographic theory. We also confirmed the cross-cultural validity of our theory of cognitive mapping to the degree that such validity can be inferred from comparable performances by five-and six-year-old populations in Massachusetts, Puerto Rico, and St. Vicent, West Indies. But we found it difficult to deal with overt environmental behavior, the other segment of our model, as easily as we had done with environmental cognition. Pilot studies were carried out in Puerto Rico, St. Vincent, and Massachusetts of free exploration, landscape preferences, direction-giving, environmental games, ecological learning --how a peasant farmer's son becomes a farmer himself -- and toy construction. The work on becoming-afarmer is being replicated in East Africa and Venezuela although the methodology is still exploratory. The first full-scale study of free environmental behavior was recently begun by Roger Hart, who has commenced an intensive long-term study of the ecology of five-to-eight-year-old children in a small community in Vermont. Thus we have tackled the overall pattern of environmental cognition and overt environmental behavior among children between the ages of five and ten in three rather different cultures, and have made some progress on the jigsaw puzzle. An overall pattern is emerging as the work on cognitive mapping comes to mesh with the work on overt environmental behavior.

When the project began, we expected to find that five-year-olds would display so primitive a level of environmental cognition and behavior that developmental research might logically start with children of this age. But all of our early data for the five-to-seven-year-old age group suggest that the most fundamental ability of all -- to orient by means of a cognitive map -- is well developed by the age of five. This demanded of us a pattern, model, theory, and -- stickiest of all -- methodology to deal with the development of cognitive aspects of environmental behavior in children younger than five. We have been working on this part of the jigsaw puzzle for roughly two years, attending primarily to macro-environmental toy play, and we now begin to discern a pattern for the age-group from three to five.

The Place Perception Project began as an attempt to explore the way young children learn about large environments, or places, and to apply our understandings to elementary education. The work of psychologists such as Mead, Lewin, Tolman, Piaget, Bruner, Barker, and many others, along with our own pilot studies prior to 1968, had demonstrated clearly that place behavior, or environmental behavior, differs, so profoundly from behavior addressed either to small objects (such as tools) or to social situations -- individuals and groups -- that a fundamentally different mode of learning must be involved although almost nothing was known about this mode of learning, nor had it been clearly perceived that fundamentally different educational strategies would be appropiate to it -- not only in Geography, but also in Social Science, Natural Science, and History. All of our work under the generous grant supplied by the Office of Education in 1968 has aimed at exploring this mode of learning -- environment learning or place learning -- and devising new educational approaches which would be consonant with the manner in which environmental learning develops in children from the age of three to adolescence.

Much of our work has consisted in identifying the attributes of environmental learning in general and at various developmental stages. The results of this research can be described as the beginnings of a general and curriculum model for environmental learning. In line with the strategy we have adopted for this Final Report, we will not proceed to discuss the findings or theory but will rather refer the reader to the publications and other disseminated reports of the Place Perception Project (PPP), where these matters are discussed at length (See Volumes II and III).

The distinctiveness of place-learning or environmental learning is discussed most fully from a theoretical point of view in Place Perception Research Reports No. 1 and 3, and four project publications "Studies of Geographic Learning". "Environmental Mapping in Young Children," "Notes Toward a Developmental Theory of Spatial Learning," The data which we have assembled in several dozen experimental and observational studies are summarized most fully in PPR Report No. 4 and in "Studies of Geographic Learnig". Most of these data deal with processes of environmental perception and cognition; other data on environmental action -- overt environmental behavior -- are discussed in several of the appended documents ,notably PPR Report No. 4, but work in this area is relatively newer and data reports are for the most part not yet available. (However, see "A Toy-Play Test of Cognitive Mapping in Three- to Five-Year-Old Children"; see also PPR Report No. 2 for pilot studies and No. 4 for preliminary data; and see PPR Report No. 6 for observational data on environmental behavior in a third grade class.)

The applications of our theoretical and empirical research to education fall into three categories: publications and other disseminated writings; demonstration-scale projects in various schools systems; and training of personnel. It should be emphasized that the Place Perception Project has been primarily a research project throughout, a point made very clearly in our project proposal: we have neither the funds nor the expertise to apply our findings on a wide scale in the schools. However, we made the additional point in our original proposal that the work of PPP would include some demonstration-level in-school projects and a considerable amount of experimentation with educational materials of the sort we refer to in the project as "perceptual surrogates" -- the distinguishing feature of a "place" or "environment" which leads to the greatest educational difficulty is the fact that it cannot be perceived as a whole by the child, and surrogates such as maps, photographs and the like are therefore crucial. We have explored such perceptual surrogates on a demonstration scale to a considerable extent. (See, for instance, PPRR Nos. 3, 6, and 8; also, "Studies of Geographic Learning" and The Use of Aerial Photographs in Teaching Mapping to Children in the First Grade.")

One crucial promise was made in our original statement of aims, three years ago: Whatever theoretical and empirical studies of children's environmental learning which were undertaken during the life of the project would bear fruit, in educational terms, during a second generation, i.e., after the grant-supported research had been completed. We stated, to be more precise, that "generation one" -- the grant period -- would involve basic research the results of which would be innovations in environmental education realized in "generation two"-- the period after the grant expired. Proof that this has indeed happened can be seen in four areas:

(1) The work-in-progress listed under "results," below;

(2) The educational materials including articles books, teachers manuals, and perceptual surrogates (in an environmentally extended sense, "visual aids"), in press and in preparation, listed both under "results," below, and as abstracts in the Appendices;

(3) The list of project personnel (see above), most of whom are students who are planning to become (or have already become) teachers, trainers of teachers, and specialists in educational research in the vital field of environmental studies;

(4) Results which are already in use in schools -- as in the school systems of Worcester, Mass., Santa Monica Region, Cal. and Windham, Vt. (see Appendices) -- and large-scale use for our findings which is anticipated shortly in Puerto Rico, and various states, as we discuss more fully below.

Perhaps we may be forgiven a measure of pride in the achievements of the Place Perception Project. It has not accomplished everything that it set out to do, but has accomplished many other and more important achievements in areas whose importance was not appreciated at the outset of the project. The Place Perception Project, we claim, has children, and in the basic roots of environmental education.

METHODS

Methodology is best discussed in conjuction with the results of the work to which it applies. In discussing the results of the Place Perception Project, we find it necessary to distinguish roughly 50 projects, including research studies and dissemination programs; each of these projects has its own methodology. It seems logical to limit the present discussion to the most general questions of method, and to refer the reader to other sections of this report for details. Most of this information is contained in the Appendices, in which most of the written reports on completed work are to be found; further information is provided in conjuction with our discussion of the individual projects, in the section labelled "results."

Subjects ranged from three-year-olds to adults, representing a variety of cultures and sub-cultures: Navajo, Black American, White American, Puerto Rican, and St. Vincentian (West Indian). Children under the age of about ten were studied by trained investigators in institutional settings -- day-care centers, kindergatens, and schools -- or in the children's homes; hence, all interaction was in familiar surroundings, and conditions, and very careful precautions were taken against psychic damage to subjects. In addition, our work was observational, not experimental: unusual behavior was not elicited.

Procedures of widely varying sorts were used. Among them the following may be mentioned:

(1) observation of toy-play in three-to-five-year-olds;

(2) identification of aerial photographs in three- to twelve-year olds;

(3) mapping from aerial photographs in three- to ten-year-olds;

(4) classroom teaching with aerial photographs in the first through fourth grades;

(5) observation of free environmental behavior in three- to twelve-year-olds.

(6) observation of parent-child teaching process regarding environmental behavior in peasant families of St. Vincent, with children aged five through twelve;

(7) experimental teaching with the "flying classroom," a twin-engined aircraft;

(8) environmental attitude interviews with high-school students and adults;

(9) use of ethnographic methods of observation, informal interview, and participant-observation with children and adults;

(10) use of the ethonoscientific method, involving ethnography and linguistics, in eliciting systems of environmental belief from verbal report;

(11) use of content-analytic techniques for eliciting such beliefs from written texts and transcripst;

(12) use of the "life-geography method" -- an adaptation by this project of the life-history method to environmental behavior;

(13) use of psychophysical methods involving map-displays with adults, and use of color-chips in color-discrimination sorting tasks with adults and children (in Navajo family groups);

(14) use of logical and semantic analysis with verbal reports, textual materials, and documents relating to the history of science and education;

(15) preparation of photographic material, air and ground maps, and written reports;

(16) organization of workshops, conferences, and demonstrations, mainly for teachers;

(17) participation in teacher-training institutes and in conferences on curriculum and materials improvements;

(18) teaching; and

(19) writing.

Special attention should be called to three basic methodological themes in the Place Perception Project. One is our emphatic insistance on cross-cultural validation. Our work involves a search for very basic forms and sequences of behavior in children, place learnig and macro-environmental behavior, a sphere in which generalization from one culture or sub-culture is inadequate. When applied to education, such generalization may be misleading or positively harmful -- misleading

when observation of child behavior in a culture fails to note the effect of particular imposed behavioral configurations, then validates these same configurations by declaring them "natural"; harmful, when environmental behavior observed in one culture or sub-culture is imposed on the children of another, on spurious grounds that the pattern is "natural" instead of culture-specific.

A second methodological theme is our attitude of neutrality toward various theories of child development. We view the conclusions of Piaget, Bruner, Erikson, and others (and those of their co-workers) with great excitement insofar as they can be applied to macro-environmental behavior. To some extent they can, but on the whole we find that no existing theoretical framework has come to grips with the phenomena of macro-environmental learning, or place-learning. For example: Piagetian views of the development of spatial conceptualization are discussed in our work from a theoretical point of view but are not often operational in our empirical work, which is "spatial" in the sense of scale, but more often spatio-temporal or processual than geometrical. Perhaps we may be forgiven for suspecting that somewhat radical new theories will be needed to account for the development of macro-environmental behavior, theories which will draw on data ranging from clinical psychology to animal behavior.

A third methodological theme is our obsession with the aerial photograph as a testing instrument and educational weapon. This obsession is in fact grounded in a great deal of theoretical thought, summed up in PPRR Nos. 1, 4, and 6; and in "Environmental Mapping in Young Children", "Studies in Geographic Learning", "Preliminary Observation on Spatial Learning among Puerto Rican Children", and elsewhere. The central concept is perhaps the resemblance of an aerial photograph to a "pure" representation of a cognitive map, and -- in regard to education -- its instant intelligibility even to children as young as three.*

Use is made in our work of advanced statistical techniques for choice of sample design and significance test, advanced technology in areas ranging from computers to photogrammetry and aviation, and advanced theoretical approaches in linguistics, logic, and semantics; but use is also made of simple, naive observation and open, unstructured interviews (including an eight-hour "life geography"). The study of environmental behavior in children is new, open, and therefore methodologically eclectic.

---

*Although commercial photographs were used when available, over 1000 were taken by the project, including verticals of 5 schools in Massachusetts and 5 in Puerto Rico, verticals of selected macro-environments, and obliques of landscape elements. A Maule M4210 STOL aircraft with mounted Fairchild K-24 camera and viewfinder was used by the project.

RESULTS

The Place Perception Project is a continuing enterprise; to express final results would be to draw an arbitrary line between the phase of the project which was supported in large part by our generous grant from the Office of Education and the phase which followed. The line is quite arbitrary, since many projects begun during the grant period are still underway or awaiting publication; hence, results from the project with acknowledgement of USOE grant support will appear for some time to come.

We have chosen to treat the Project as an undivided whole in this report. Therefore, the work done under the grant will not be separated from work done under other auspices during and after the grant period. By implication, work which began under the grant but has not yet yielded final results will be discussed in series with work which began after the grant expired but which nevertheless <u>has</u> already yielded such results. In fact, we will simply follow the logical procedure of listing all our projects and indicating the status of each in turn. Since the list extends to about 50 projects, some preliminary words are needed to see overall strategy.

The distinction between basic and applied research is far too arbitrary to be of any use in the present context. <u>All</u> our work is aimed at eventual application to the improvement of environmental education. "Basic" studies are those for which we see no application in the very short-run; "applied" research is obviously close to or already in the classroom.

It would be equally arbitrary, in the present case, to distinguish research activities from dissemination. All of our research is, at the very least, disseminated in the form of widely circulated documents. In fact, we developed the Place Perception Research Reports as a means of disseminating PPP results as rapidly as possible to leaders in geographic and environmental education. (See Appendix I: a letter from the President of the National Council for Geographic Education which was sent to some 200 leaders in this field. in connection with our program of mailing PPP Research Reports to these leaders). The Report is placed in the hands of those who can most rapidly use it very soon after the work itself is done, with no publication delay. Articles are then prepared for publication at a later date.

When the Place Perception Project began, we envisioned a pattern of eight sub-projects, but the pattern has both changed in form and become somewhat blurred. The original sub-projects (now called "themes") remain, but the focus and importance of each has changed, while a ninth has been added. Furthermore, the themes do not correspond to the specific tasks (now called "projects"): in other words, as the work progressed, it

became more difficult and finally impossible to place our on-going projects under the original classification. The principal reason is simply an evolution of our theoretical structure as the data poured in, an evolution which changed it so radically in form that our more recently-started projects were selected to follow up the findings of earlier projects, whether consistent with the overall research structure or not. It would not, for instance, be possible to predict from the original classification that much of our work during the third year of the project would deal with toy-play in pre-school children. Yet the eight original themes, along with a ninth that has more recently been added, should at least be mentioned. Two of the eight have been dropped; the remaining six have changed greatly in form; but these six themes plus the new one give a crude classification of the work of the Place Perception Project as a whole, and our subsequent listing of specific projects will tie each project to the theme or themes to which it is mot relevant.

Themes

Theme 1. Environmental Cognition at School-Entering Age: Base-Line Data for the Design of a Primary Curriculum. Under this theme are grouped a large number of non-developmental studies of children around the ages of five and six. The aim is to obtain a global picture of the capacities of children at the age of school entrance for environmental education, and particularly for work with symbolic representations and surrogates of macro-environmental phenomena such as towns and ecosystems. Our findings were quite startling: children at this age are already engaged in mapping and macro-environmental symbolism in ways that can readily be channeled into education.

Theme 2. Map-Reading, Map-Perception, and Map-Learning. This theme embraces two very different sets of projects. One is a set of psychophysical experiments dealing with map perception in adults, the aim being to improve the legibility of maps for use in education. The other is a project aimed at analyzing the map as a linguistic system, using semantic, logical, and linguistic techniques. The aim of the latter was to distinguish those elements in mapuse which require linguistic skills and determine how such skills can be related to map-learning. Reflexively, we found that studies of the written natural language as a form of one-dimensional mapping show some promise in terms of the problem of reading skills.

Theme 3. Developmental and Cross-Cultural Studies of Environmental Cognition. This theme may be described as our attempt at a general theory of environmental learning. The reader is referred to PPR Reports, Nos. 1 and 4. and to the articles, "Environmental Mapping..." "Notes..."

"Studies..." and, for the recent work with three-to-five-year-olds, "A Toy-Play Test of Cognitive Mapping..."

Theme 4. The Use of Aerial Photographs in Teaching Map Skills, Geography, and Macro-Spatial Concepts, Grades 1-6: A Report of Empirical Tests and Trial Curricula. A great many "applied" studies in the elementary grades fall in this category.

Theme 5. Photo-Maps and other Semi-Maps. This theme was originally aimed at bridging the gap between aerial photographs and true maps. But first graders learned map-reading so readily from aerial photographs that the gap proved trivial. Although many techniques combining the iconic quality of the aerial photograph with the symbolic capability of the map will no doubt be tested and found useful in the future, no work along these lines has yet begun in this project.

Theme 6. Environmental Simulation Systems. Given the high cost of the "flying classroom," it was thought for a time that simulation of the flying experience. using techniques developed by NASA and others, might prove useful. However, we found that the potential of aerial films and photos was enough to justify shelving this approach which is itself very costly.

Theme 7. The Classroom on Wings and Wheels. Two projects which deal with the "flying classroom"--teaching about the macro-environment from an aircraft-- and one project which is attempting to use a railroad train as a moving classroom fall under this theme. Both approaches show promise.

Theme 8. Toy Landscapes and the Origin of Macro-Environmental Learning: Studies of the Ability of Three-to Five-Year-Old Children to Construct Macro-Environments in Free Toy Play, and a Theory of Environmental Learning that Explains these Findings. The label is self-explanatory. This work, along with studies of pre-school photo-interpretation, replaces the earlier plans to experiment with a "linoleum landscape."

Theme 9. Cathectic and Aesthetic Aspects of Environmental Learning. This new and exciting theme has expanded as two sorts of findings flow in: the value-loading of map-meanings, which clearly have a vectorial signification combining cognitive and valent (or cathectic) elements; and the problems of bias in geographic thought and notably in textbooks. A number of pilot studies have been generated, though few definitive results have been obtained. The theme has been extended beyond education to possible clinical applications ("geo-therapy").

Each of these themes except no. 5 is dealt with in a plurality of specific projects, which we list below under four categories: Completed Projects; Completed Pilot Studies; Projects in Progress; Pilot Studies in Progress. Some of the projects and pilot studies which are listed as "completed" are of course continuing into a new phase after completion of the first.

Completed Projects

1. The ability of first-graders in Worcester County schools to interpret aerial photographs. Initiated 1967; new data obtained in 1969 (for a total of 107 subjects); analysis completed 1969. Directed by J. M. Blaut; research associates A. S. Blaut and (in 1967) G. F McCleary; others involved in the project include J. Brennan, J. Corcoran, E. Donahue, L. Feldman, M. Lank, N. Lawson, B. May, C. McManus, M. Muir, and D. Stea. Reported in Place Perception Research (henceforth PPR) Report No. 1 and "Environmental Mapping in Young Children" (appendices). (Themes 1, 4.)

2. The ability of first-graders in the Caparra . elementary school, Río Piedras, Puerto Rico, to interpret air photos, 1967-69. Cross-cultural replication of Project 1. Directed by J. M. Blaut with A. S. Blaut and others. Reported in PPR Report No. 1 and "Environmental Mapping..." (appendices). (Themes 1, 4.)

3. The ability of first-graders in Worcester Mass., to trace maps from air photos and use the maps in simulated navigational problems. J. M. Blaut, A. Blaut, M. Muir, and D. Stea. Reported PPR Report No. 1 and "Environmental Mapping..." (appendices). (Themes 1,2,3,4.)

4. The ability of kindergarten children in Puerto Rico to interpret aerial photographs: an experimental design involving 120 children in kindergartens of four communities (rural-peasant, rural-plantation, urban-slum, urban-middle class), using photos of all four schools presented to all children in experimental group. Directors: J. Blaut and D. Stea, with Zaida Berríos. Reported PPR Report. No. 4 and in "Studies in Geographic Learning" and "Some Preliminary Observations o on Spatial Learning in Puerto Rican School Children" (appendices). (Themes 1,2,3,4.).

5. The ability of 2nd, 4th, and 6th grade children in two Puerto Rican schools and communities to interpret aerial photographs. The photos of two of the schools (the rural peasant and urban middle class schools from Project No. 4) were used. The Kindergarten data from Project No. 4 were also combined experimentally with those of the present study to obtain a K-6 series. D. Stea, J. Blaut, D. Kasnitz, J. Bloom. Reported in PPR Report. No. 4, in "Studies in Geographic Learning," and in "Some preliminary Observations on Spatial Learning in Puerto Rican School Children (appendices). (Themes 2,3, and 4.)

6. An experimental curriculum in first-grade map-learning, using aerial photographs, in Boylston, Mass. and secondarily Paxton and Whitinsville, Mass. First-grade children were taught how to read and make rather sophotisticated planimetric maps with USGS semiotic at 1:12,000 scales by working from air-photo interpretation via tracing and free drawing to mapping. M. Muir, with J. Blaut and others. Reported in PPR Report No. 3, in "The Use of Aerial Photographs in Teaching Mapping to Children in the First Grade: An Experimental Study," and in "Studies of Geographic Learning" (appendices). (Themes 1,2, and 4.)

7. An experimental curriculum using aerial photographs as perceptual surrogates in teaching theoretical concepts of geography and macro-environmental aspects of social science and earth science in the third grade, with lower-income children in Worcester, Mass. This and the following study successfully showed that advanced macro-spatial concepts can be taught at 3rd-grade level, concepts now being introduced at the high-school level, if perceptual aspects are emphasized, either with aerial photographs or with actual aerial experience. R. Hart, with J. Blaut and others. Reported in PPR Report No. 6 and "Studies of Geographic Learning (appendices). (Themes 2,3, and 4.)

8. An experimental curriculum using the "flying classroom" and air photos to teach geography and macro-spatial concepts to third graders from lower-income aereas of Worcester, Mass. (The "flying classroom" in this study was a high-wing, twin-engine aircraft with commercial pilot and teacher-copilot. R. Hart, with J. Blaut and others. Reported in PPR Report No. 6 and in "Studies of Geographic Learning" (appendices). (Themes 2,4, and 7.)

9. Concepts of Space, size, and environment: epistemology and history of spatial ideas in relation to geographic and environmental education. This project explores two sets of models which are crucial to geographic and macro-environmental education first of all, the epistemological models of space, spatial attributes (or qualities),

such as scale, and environment, which are currently accepted and thus tend to form axiomatic elements in the curriculum; and second, those models of space, environment, and the like which were current in earlier geographic and educational thought -- e.g., that of Frobel and Ritter -- and in some cases remain as unrecognized curricular axioms. The first problem involves philosophical and logical-linguistic analysis of concepts; the second, work on this history of ideas. The major phase of study on the first problem has been completed. J. Blaut, Reported in PPR No. 1 and in "Space, Structure, and Maps" (appendices). (Themes 2. and 3.)

10. Review of current theories on the development of spatial cognition in children. R. Hart and G. Moore. Reported in PPR Report No. 7 and forthcoming "Critical Issues in the Environmental Behavior of Children" (appendices). (Theme 2.)

11. The ability of first-graders in a peasant community of St. Vincent, West Indies, to interpret aerial photographs. Using an air photo of a portion of St. Vicent, the study undertook a critical cross-cultural verification of air-photo reading ability in pre-literate children, testing in an area where comparable perceptual imagery (e.g., picture magazines and television) is not to be found. C. Briggs, J. Blaut, and R. Hart. Preliminary reports in "Environmental Mapping in Young Children" and "Studies of Geographic Learning" (appendices). (Themes 1,2,3,and 4.)

12. Study of perceptual organization and thematic map communication. Psychophysical experiments on the ability of subjects to perceive figural imageson map-like presentations in which figure and ground are varied. B. Dent, with G. McCleary and others. Reported in PPR Report No. 5 (appendix). (Theme 2.)

13. Psychophysical parameters of map perception. C. Chang, with G. McCleary and others. To be reported in forthcoming PPR Report No. 11. (Theme 2.)

14. The home range of Black elementary school children (grades 2 and 4) in Baltimore, Md. A study of the activity spaces and conceptual spaces of Black children in Baltimore, intepreting their use and conception

of home range by means of interview, air-photo protocols, free mapping, and observation. M. Tindal, with J. Anderson and others. Reported in PPR Report No. 8, and in the paper "The Concept of Home Range: New Data for the Study of Territorial Behavior (J. Anderson and M. Tindal) (appendices). (Themes 3, and 9.)

15. Studies of map linguistics. Semantic and syntactic analysis of mapping as a language. J. Blaut, with others. Report in PPR Report No. 1, "Environmental Mapping in Young Children." "Space, Structure and Maps." "Studies of Geographic Learning," and elsewhere (see appendices). (Themes 2, 3, and 9.)

16. Studies of the concept of spatial orientation. Theoretical and experimental work on frames of reference, cognitive maps, and orientation. The experimental work was done in Brazil (but not funded under this grant.) D. Stea. Report in PPR Report No. 2 and in the forthcoming paper, "Some Notes on Orientation" (appendices). (Themes 2 and 3.)

17. A theory of environmental learning in children. Elements of a cross-cultural theory to explain the modes of environmental learning at various developmental stages, with experimental data supplied largely from other work in the Place Perception Project. J. Blaut and D. Stea. Although the full theoretical statement will appear in a book now in preparation (Environmental Learning, J. Blaut and D. Stea, Aldine-Atherton), several theoretical statements are reported in PPR Reports No. 1 and 4, in "Studies of Geographic Learning," "Environmental Learning in Young Children," and -- most fully -- in "Notes Toward a Developmental Theory of Spatial Learning" (appendices). (Themes 2, 3, and 9.)

18. The metrics of conceptual space. Theoretical and experimental work on the metrical properties of conceptual distance and cognitive maps. D. Stea. Reported in PPR Report No. 2 and in a paper (in press) "On the Metrics of Conceptual Spaces: Distance and Boundedness in Psychological Geography" (appendices). (Themes 2 and 3.)

19. Toy-Play Test of Cognitive Mapping in Three-to Five-Year-Old Children, Massachusetts. Study of the role of toy-play in the formation of cognitive maps, providing substantial confirmation of the hypothesis that toy-play is a crucial element in environmental learning and part of the explanation for pre-school mapping abilities uncovered

elsewhere in our work. D. Stea and J. Blaut, with A. Bates-Gee, J. Bloom, R. Hart, D. Kasnitz, M. Lynch, L. Mark, T. Nickerson, and R. Norin. To be reported in the forthcoming PPR Report No. 9 and in "A Toy-Play Test of Cognitive Mapping in Three- to Five Year-Old Children," manuscript ready for submittal to Developmental Psychology (D. Stea and J. Blaut); "Modelling through Toy-Play: Methodology for Eliciting Topographical Representations in Children" (L. Mark) to be presented at 1972 Environmental Design Research Assn. (EDRA) annual conference and presumably published in Proceedings of the conference; and "Toy Geography: Explorations into the Role of Toy Play in Early Environmental Learning" (D. Stea and J. Blaut), to be presented at EDRA 1972 conference and published in Proceedings of the conference (appendices). (Themes 1,2,3,5, and 8).

20. The ability of three-year-old in Massachusetts to use aerial photos as maps. Three-year-olds were found to be capable of drawing complicated routes on a large-scale (approx. 1:1,000), large size (3' x 3') aerial photograph laid on the floor of a day-care center playroom. J. Blaut with L. Mark, A. Blaut, and R. Hart. To be reported in PPR Report No. 9 and in "All of the Houses of the People who Live Here" (J. Blaut), an article in preparation as a commissioned chapter on children's geographic learning for a forthcoming book on cultural geography (Jess Walker, ed., Festschrift for F. B. Kniffen, Louisiana State University Press, probably 1972). (Themes 2,3,4, and 8.)

21. A curriculum theory for elementary geography. J. Blaut and D. Stea presented several elements of a curriculum theory for elementary-school geography at a workshop held at Peabody College in 1970 (under auspices of the National Council for Geographic Education), based on the results of the Place Perception Project, and including a set of sequential models (developmental, historical, theoretical, and aggregative), a "natural model" based on environmental learning as observed cross-culturally, a set of research priorities on environmental learning as related to elementary geographic education, a communication model for map-learning, and related matters. Results will be reported in a book now in preparation, Environmental Imagery in Elementary Education: A Teachers Manual (J. Blaut, D. Stea, and R. Hart), and in a second such book, Environmental Learning (J. Blaut and D. Stea: Aldine-Atherton, probably 1972). (Themes 1-9.)

22. Theoretical and cross-cultural studies of technological cognition. This project, perhaps the most far-ranging of all those undertaken, involves both analytic research and cross-cultural field work aimed at developing a general model of one aspect of environment cognition and learning: the use of material resources and material culture, and notably the use of tools. The field work (under other funding) involves study both of St. Vincent peasant children in technological learning situations, discussed further below, and study in St. Vincent and Venezuela of adult technological behavior and its cognitive components (as a means of determining the end-point of technological learning under schooled and unschooled conditions). The latter work is reported in PPR Report No. 1 and No. 4, in "A Theory of Peasant Land-Use Behavior" (J. Blaut), forthcoming in Proceedings of the Bi-National Conference of Israeli and American Geographers, Jerusalem, Hebrew University, probably 1972 (appendix) and in "All of the Houses of the People Who Live Here" (see above). Theoretical studies are discussed further below, (Theme 3.)

23. Theoretical studies of cognitive mapping. Much of the theoretical work by D. Stea and J. Blaut under project auspices has dealt with the problem of developing and testing models of the Cognitive Map as a basis for map education and environmental learning. The general theory will be published in the book Environment Learning; certain parts of it have been reported in PPR Reports No. 1 and 4. One aspect of the problem which develops project ideas but was not carried out under project funding has been dealt with by D. Stea and R. Downs, and is reported in "From the Outside Looking in at the Inside Looking Out" (D. Stea and R. Downs), in: D. Stea and R. Downs, eds., Cognitive Representations of Man 's Spatial Environment (special issue of the journal, Environment and Behavior, Vol. 2. No. 1. 1970), and in D. Stea and R. Downs. "Introduction" to the forthcoming book, D. Stea and R. Downs, eds., Cognitive Mapping: Images of Man's Spatial Environment (Aldine Atherton, in press). (Themes 2,3, and 9.)

24. The ethnogeography of learning: theory, methods, and pilot data (U.S.P.R. and St. Vincent). A new theoretical approach, termed "ethnogeography," has been developed jointly by J. M. Blaut (working largely within the Place Perception Project, with USOE funding except for foreign research), Gregory Knight, Chairman of the Department of Geography at Pennsylvania State University, and others. The approach involves careful analysis of cognitive-cathectic models, or schemata, through the linguistic analysis of textual data including transcripts of verbal behavior as well as written and published texts. The approach,

partly a development out of "ethnoscience", as used in anthropology, permits us to obtain an understanding of the overall belief system concerning geographic processes and environmental behavior by drawing the informant's statements together into a coherent model, the elements of which are propositions laid out in chains of logical, perceptual, and normative validation. The approach has evident applications to education. It permits developmental analysis, with crucial cross-cultural validation, of our theories of geographic learning. It permits linguistic and content-analytic study of school materials, notably texts, to determine the characteristic propositions asserting geographic and macro-environmental veridicality, and can obviously be extended to a teacher's oral discourse, as well. A statement of ethnogeographic theory and its cross-cultural method is contained in a paper by J. Blaut and G. Knight, "Ethnogeographic Models" (manuscript in draft stage). Pilot data concerning geographic learning among children in a St. Vincent peasant community, and corresponding data concerning the manner in which the environmental belief system is instilled by parents of the community, is to be reported in PPR Report No. 13, in a paper by J. Blaut and Benjamin Wisner. Ethnogeographic analysis of textbooks is still in the pilot stage, and is discussed below as a pilot project. (Themes 3 and 9.)

25. Psychophysical and linguistic elements in environmental perception: A cross-cultural study of Navaho color categories. The relation between color discrimination as a psychophysical phenomenon in perception and color categories in language is an important question in determining the validity of language as a predictor of variation in environmental perception, between cultures and between developmental stages. David Stea, Dan Carson, and Benjamin Wisner have compared the Navaho perceptual and linguistic spectra (using Munsell color-chip pair discriminations for the former) in an effort to test the much-discussed, and crucial, hypothesis that color terms in the Navaho language suggest a qualitative difference between the environmental perception of Navahos and Anglo-Americans. Significant differences were not found in children or adults. Reported in D. Stea, D. H. Carson, and B. Wisner, "Navaho Color Categories and Color Discrimination: An Experiment in the Relation Between Language and Perception." Proceedings of the XIIth Congress, Interamerican Psychological Society, in press. (appendix). (Themes 2,3, and 9.)

26. Cognitive Mapping in Urban Environments of Mexico. A further study involving cross-cultural validation -- a necessary element, we believe, in the development of a sound theory of environmental learning and thus a firm basis for innovations in environmental education -- was undertaken in Mexico by David Stea in collaboration with Denis Wood.

(USOE funding was not employed for the field work in México). The study traced the urban cognitive maps which are held by young and old inhabitants of four Mexican cities, thus securing important data on the cognitive maps which are held by school children of Latin cultures and children in general. To be reported in D. Stea and D. Wood, "A Cognitive Atlas: Exploration into the Psychological Geography of Four Mexican Cities," PPR Report No. 10, forthcoming. A Spanish translation is to be published by the Instituto Nacional de Antropolgía e Historia, México, D.F. (Themes 3 and 9.)

Completed Pilot Studies

The distinction between a "project" and a "pilot study" is of course somewhat arbitrary. We list a study under the latter heading if it has not gone beyond the pilot-project stage, yet has reached completion (if not always publication) at this stage.

27. The ability of first-graders in Río Piedras, Puerto Rico, to trace maps from aerial photographs. This study was the pilot test for project number three, discussed above. Since the data were obtained from four Puerto Rican children in this pilot test, we have partial cross-cultural validation of the results obtained in the larger project. J. Blaut. Reported briefly in PPR Report No. 1 (appendix). (Themes 1,2,3,4,).

28. Large-Scale Aerial Photographs in Pre-School and Elementary Education. At the outset of the Place Percepti on Project, it was decided to explore the use of the "linoleum landscape," pictorial landescape prepared in linoleum as a visual surrogate of the macro-environment as seen from above -- from a map perspective. As we learned more about children's ability to deal with ordinary aerial photographs, we found that large (36" x 36") blow-ups of air photos, when placed on the floor, generated the kind of play and learning-behavior that we had predicted for the much more primitive linleum picture-map. Observational studies were carried out by Roger Hart, with J. Blaut, on populations of five - and nine-year-olds, using photographs with scales ranging from about 1:5,000 down to 1:2,000. (Figure 1, is an example of one of the photographs before enlargement). Reported in PPR Report No. 6. "Aerial Geography" (R. Hart), and briefly in PPR Report No. 4 (appendices). (Themes 2,4,5 and 8.)

29. Free environmental behavior among pre-school children in Massachusetts. Jill Bloom recorded and mapped the movements of pre-school children in the play-yard of a Worcester day-care center during three daily outdoor play periods. Reported in PPR Report No. 2. (Theme 3.)

30. Free Environmental Behavior and Exploration among Children in a City Park. This is a somwhat impressionistic pilot study, involving observation of free play behavior in Elm Park, Worcester, by Marilyn Soergel and Caroline Garside. Reported in their essay, "Children's Environmental Perception and Behavior in a City Park," in PPR Report No. 2. (appendices). (Themes 3 and 9).

31. Role and Verbal Direction-Giving. Among a series of exploratory studies of verbal, gestural, and other forms of body-mapping (discussed theoretically in PPR Report No. 1), one pilot study carried to completion was Roger Bullock's exploration of the manner in which perceived roles of self and other influence the manner in which directions are given in the macro-environment, including the selection of landscape elements and distance-estimates. Although conducted only at the pilot level, this study is to be followed up as a means of probing the relation between social perseption and environmental perseption in the shcool context. Reported in Bullock's essay, "Direction Giving and Environmental Perception," in PPR Report No. 2. (Themes 3 and 9).

32. Cathectic Elements in Map Perception. Prior work by David Stea and others (Project 18, above) had shown the influence of preference on distance estimation; Linda Gurvitz used a different approach to explore the influece of negative cathexis on size-estimation of map areas (U.S. and Russia) among 11-year-olds in Massachusetts. Although her study was conducted at a pilot scale, it suggested that children may under-estimate the size of map-areas carrying negative valence. To be reported in PPR Report No. 15. (Theme 9.)

33. Cathectic Elements in Landscape Imagery among High-School Students. Deborah Kasnitz carried out an exploratory study of the cathectic response evoked by various forms of landscape description in a group of Massachusetts high-school students. To be reported in PPR Report No. 15. (Theme 9.)

34. The Age-Specific Land-Use Map: A Pilot Study of Land-Use Preference among Children of Barranquitas, Puerto Rico. Environmental Learning in free behavior is as much a concern of the project as is environmental learning in the school. Thus we are much interested in the problems of designing (and un-designing) outdoor recreation areas for children's play. One step toward this goal is to discover, for each age group in a community, the environmental categories which are cognitively recognized, along with the valence and frequency-of-use for each category; the result should be a series of age-specific land-use maps, the legends of which may differ markedly from those found on ordinary or adult land-use maps. Such maps would indicate the preferred and frequented environments for children of different ages, and thus lead to better recreational planning for children. A pilot study along these lines was conducted in Barranquitas, Puerto Rico, by Denis and Ingrid Wood, with others of the project. To be reported in PPR Report No. 15. (Themes 3 and 9.) (See Figure 3.)

35. Toy Inventory and Toy Construction Study, Richland Park and Mesopotamia, St. Vincent. Environmental toys of two types, surrogate models (tiny houses, etc.) and vehicles (scooters, etc.) have proven to be crucial elements in environmental learning. A general theory concerning the role of toy-play in environmental learning must involve cross-cultural comparison, with special attention to cultures and communities in which the children must fashion all or most of their own toys out of local natural resources. After casual observation of toy use in Venezuela and México, we decided to attempt a systematic study of two aspects of toy use in two peasant communities of St. Vincent, West Indies. An inventory was made of all toys found in use by children of all ages; some 200 types were recognized, nearly all constructed of wild resources (e.g., banana gell as lubricant of wheels) or scavenged items, and many of those built and used by older boys falling into the category of scooter-like "wheelies," often of complex manufacture. (See Figure 4.) C. Zerner, with J. Blaut, J. Bloom, and C. Briggs. To be reported in PPR Report No. 14. (Themes 3 and 8.)

36. Learning to be a Farmer in St. Vincent. In spite of our emphasis on that aspect of environmental learning which involves the solution of macro-scale problems by means of cognitive mapping, exploration, and the like, the project has undertaken several studies of the aspect of environmental behavior that involves the use of resources and tools, and mainly of the manner in which resource-use and tool-use are learned. One such study was carried out in Richland Park, St. Vincent, involving care-

ful observation of farm children in the field with their parents and long interviews with parents and children. Although lack of field time prevented the project from becoming more than a pilot study, seemingly reliable results were obtained on the modes, sequences, and approximate ages associated with the learning of all aspects of peasant farming. Ben Wisner, with J. M. Blaut. To be reported in PPR Report No. 14. (Themes 1, 3, 8, and 9.)

37. Environmental Play-Behavior of Pre-School-Age Children in Mesopotamia and Richland Park, St. Vincent. Given the need for detailed study of children's environmental learning in contrastingly different cultures -- a point stressed throughout this report -- but given also the fact that we have no reliable methodology for observing and interpreting children's environmental behavior in an unfamiliar culture, we decided to fall back on the old ethnographic technique of sitting, watching, sketching, and taking notes for long, motionless periods (thereby minimizing observer effects on a child's behavior). The technique was tried out in two St. Vincent peasant communities, with two observers and four cooperating families; the study extended over three weeks of observation (see Figure 5). Jill Bloom and Cynthia Briggs. To be reported in PPR Report No. 14. (Themes 3, 8, and 9.)

38. A Test of the Life-Geography Method in Analyzing Environmental Cognition. The life-geography method is a technique developed by the project, a hybrid between the anthropologist's life-history method, as it would be adapted for interviews in which behavior, cognition, and values are elicited mainly in the realm of environmental behavior, and the ethnogeographic method as one would employ it in the analysis of tape-recorded linguistic reports. The method was used in St. Vincent: warm and gracious Mr. Joiles recounted his life as a farmer, mason, plumber, and carpenter to Ben Wisner and J. M. Blaut. The tapes are not yet fully analyzed, but the experience convinced us of the value of this method and some of the problems it generates. To be reported in PPR Report No. 14. (Themes 3 and 9.)

39. Environmental Belief Systems Displayed in High School Geography Texts and Analyzed by Techniques of Content Analysis and Ethnogeography. Blaut developed a model for the system of communication, reward, and power by which environmental beliefs are forced into consistency with the value-structure of a culture or its elite. The model suggests that geography school texts will display the belief system in very nearly its vetted and official form. Hence, textbooks are important data for analyzing a formalized environmental cognition system. But the analysis clearly can be used to comb out prejudice and ideology, and this seems more urgent. A committee led by Reed Stewart has been analyzing geography texts

dealing with Africa; a preliminary report is given in his article, "Troubling Textbooks," Antipode 1(1969):34-36. Other studies are in progress, among them a comparison of the environmental beliefs concerning the Amazon as displayed in Brazilian and U.S. school texts (D.Stea). (Themes 3 and 9.)

Projects in Progress

40. Aerial Photographs in Elementary Education: Classroom Demonstrations and Teacher-Generated Experiments. The results of various experiments and small-scale demonstrations concerning the utility of aerial photographs in elementary education are now being put to use on a larger scale in a number of school systems. In addition, teachers in some of the schools have been asked to experiment with aerial photographs in whatever new ways seem to them to hold promise. Such application has begun in the Worcester, Mass., and Santa Monica Region, Calif., school systems, is shortly to begin in the Montpelier, Vt., system and the experimental school of the University of Puerto Rico, and is being planned for introduction in the school systems of Puerto Rico and Chicago and various schools in Vermont. When sufficient feedback has taken place, the results will be published in the Place Perception Research series and in journals.

41. Bibliography on Cartographic Education. A computer file of materials relating to cartographic education is being compiled by David Dronsick and G. F. McCleary, Jr. A print-out will be offset-printed as Place Perception Research Report No. 13.

42. Oblique Aerial Photographs of Meso-Scale Landscape Features. A set of some 400 low-level oblique air photos of Puerto Rican meso-scale (perceptual scale) landscape features, ranging from houses and trees to hills and parks, has been taken from a light aircraft (the project's Maule M4210) by David Stea and J. M. Blaut. The photos are to be keyed to environmental vocabularies of kindergarten and first-grade children in Puerto Rican schools and incorporated in experimental picture-books designed to broaden the children's understanding of environmental features and feature-categories to the widest possible extent.

43. Map Lettering as a Quantitative Symbol. A thesis dealing with this problem, of great relevance to education, is being prepared by Karen E. Thompson under the supervision of G. F. McCleary, Jr., at Clark University.

44. "Flying Classroom": Evaluation of Aircraft Types. Since the Place Perception Project began, a continuing evaluation of aircraft available on the market and in various design stages has been underway to discover the best type or types for use as a "flying classroom" in the elementary grades (theme 7). Preliminary results were reported in PPR Report No. 4; a newer list of suitable types will be found below in the Appendices. J. M. Blaut and Roger Hart.

45. "Flying Classroom": Parental Acceptance Studies. If aircraft are to be used in elementary education, parental acceptance is a necessary condition. Two surveys were taken to obtain partial answers to the question of parental acceptability, one in Paxton, Mass., with 115 respondents, and one in Worcester, Mass. -- a low-income area -- with 77 respondents; acceptance rate was about 90%. Further surveys are to be carried out. J. M. Blaut and Roger Hart.

46. Studies of the Ecology of Space Use by Children of Pre-School and Elementary-School Age. A study on this subject in southern Vermont has recently been started by Roger Hart as research for a dissertation at Clark University.

47. Landscape Modelling in Free Toy Play by Kindergarten Children in Corozal, Cataño, Dorado, and Río Piedras, Puerto Rico. Prior to the project recorded as no. 18, above, a series of 40 toy-play protocols was obtained in four Puerto Rican kindergartens, respectively a peasant, plantation, urban-lower-class and urban-middle-class community. Patterns of free play were recorded without verbal or behavioral post-test. It was decided to obtain further protocols before completing the analysis. David Stea, J. M. Blaut, Deborah Kasnitz, and Jill Bloom.

48. Cathectic Mapping. Several exploratory studies of cathectic or value mapping have been undertaken by David Stea and J. M. Blaut. Preliminary statements will be found in D. Stea, "On the Metrics of Conceptual Spaces: Distance and Boundedness in Psychological Geography" (PPR Report No. 2) and in J. Blaut, "Nice Place Theory," a paper to be published in PPR Report No. 15.

49. Geo-Therapy. An offshoot of our studies concerning the educational implications of our theoretical models of environmental learning has been an exploration of certain therapeutic implications. A preliminary statement entitled "Geo-Therapy and the Morality of the Environment" has been submitted to Landscape.

50. Cross-Cultural Studies of Environmental Learning in Peasant Communities. In addition to the pilot study reported as no. 36, above, studies have begun on the same problem -- that of parent-child transmission of technological and macro-environmental knowledge in pea-

sant cultures as a means of developing a cross-cultural model of non-school-related learning processes -- a parallel study has begun in East Africa (Ben Wisner) and in Venezuela (J. M. Blaut).

51. Aerial Cinematography for Elementary Education. A project designed to simulate the aerial perceptual experience by means of cinematographic techniques has been started under the direction of Dan Carson, with David Stea and J. M. Blaut; a film designed to teach mapping to first graders in this way is being prepared.

52. The Relation of Reading to Map-Learning. Data obtained in projects no. 6 and 7 suggest that map-learning abilities may not correlate very well with reading ability and rate in the lower elementary grades. A major program of research on the relation between the two is being planned, including empirical testing of the relation and theoretical analysis of parallelisms between the syntactic structures of maps and written natural languages (which are, in part, one-dimensional maps) as well as the micro-structure and semiotic. J. M. Blaut, Leonard Mark, and others.

53. The Classroom on Wheels. The "moving classroom" can be considered a generalization of the concept, the "flying classroom," and many of the perceptual benefits of the latter can be obtained from earthbound moving classrooms. Feasibility studies for the use of railroad cars and entire trains for this purpose are well underway (David Stea, with J. M. Blaut and David Weaver); use of the bus is also being reviewed.

54. Psycho-linguistic Study of Environmental Description among Puerto Rican Children. Lexical and syntactic elements in spontaneous verbal description, with ten-year-old and and other subjects, in Barranquitas, P. R. Andrew Goldman, with Deborah Kasnitz.

Other projects and pilot studies in progress are discussed in Place Perception Research Reports, particularly no. 4.

Other Project Results.

Apart from research results, reported above, the major accomplishment of the project fall under two categories: training of educational personnel and dissemination of findings. The latter subject is discussed below, under Applications. The former perhaps needs no discussion other than a listing of the many undergraduate and graduate students who have worked with the project -- see the list given in the Appendics, below -- and a note of the fact that four masters theses and one dissertation have been written under the project, one additional masters and one dissertation are underway, and several courses and seminars have been enriched with project findings.

CONCLUSIONS AND APPLICATIONS

It was pointed out at the beginning of this report that we aim to present little more than a sketch of the Place Perception Project in the report itself, relying on our technical reports and publications to do the task of substantive presentation. This strategy holds true for the discussion of our overall findings and their application to education. We will summarize only those findings which relate to the central problem of the project, environmental learning and mapping behavior in children, saying nothing about the data obtained in many other projects and pilot studies. Theoretical conclusions will be discussed more comprehensively than empirical findings, but in no greater detail. The applicability of our data and theory to elementary and pre-school education will be dealt with somewhat less briefly. We again urge the reader to consult our publications, research reports, and other disseminated materials for matters of substance and depth; full reference to these items is given elsewhere in this final report.

Summary of Findings

Our most important and most general finding about environmental learning processes in children can be summed up this way: Children learn about macro-environmental events, both cultural and natural, in a somewhat different way than they do about other things, and macro-environmental learning reaches fairly sophisticated levels at much earlier ages than prior work has led us to suspect. This is most strikingly revealed in mapping behavior, which embraces much of the cognitive and symbolizing dimension of macro-environmental behavior as a whole.

We have found that children at the age of three can solve many forms of mapping problem. They can identify many meso-scale (perceptual scale) features on aerial photographs, displaying thereby an ability to "read" the syntactic properties of a map: its properties of reduction and rotation, or ordinal scale and ordinal projection. They can recognize macro-environmental Gestalts in toy-assemblages of their own making -- the individual toys, meso-scale landscape elements, supplied of course by us -- and can

use these Gestalt concepts of community, spatial pattern, and the like, to solve simulated navigational problems, both on toy assemblages and on aerial photographs. These abilities emerge before the child can properly describe his macro-environmental actions, models, and fantasies in oral language; hence they are at least partly independent of, and partly prior to, verbal learning -- a fact which may help explain the absence of data on early environmental behavior and cognition: such data are usually sought within a framework of research which relies very heavily on verbal report. In our toy-play studies, five-year-olds perform much better than threes and fours in a test of their ability to use macro-scale verbalizations ("town," "the world," "all of the houses of the people who live there") in describing their toy assemblages. But threes perform almost as well as fives in behavioral tests to elicit macro-environmental concepts and cognitive maps. If this combination of sophisticated ability at the age of three and lack of progress during the next two years is confirmed in other, equally non-verbal modes, then we will have much to ponder about concerning the surprisingly early, and surprisingly distinctive, processes of macro-environmental learning. (See Figure 5.)

Many studies were carried out with five- and six-year-olds to determine their ability to conceptualize at the macro-environmental scale and their ability to form and represent a cognitive map. Most of the data come from tests of air-photo identification; some, from tests requiring the representation of a map derived by tracing an air photo; one, from an expermental curriculum which began with air-photo interpretation and ended with map-making at a rather advanced level (for first-graders, that is), using standard topographic map symbols, syntax, and scale. (See Figure 6.) Thus we obtain the general finding that first-graders can indeed acquire map skills, both perceptual and representational. Some of the skills have been acquired in pre-school years. The rest can be developed by drawing upon the child's pre-school experience and expanding it in the classroom. These data for mapping behavior at school-entering age have been corroborated cross-culturally, in rural and urban Puerto Rico and rural St. Vincent. This cross-cultural validation convinces us more than anything else that mapping is a very early, basic skill. It is "natural" in the sense of being acquired informally in the pre-school years. It may even be "natural" in a wider sense, as reflecting a fundamental, universal ability. Certainly we may assume that map-learning abilities are present, and developed, at such an early age that a child can use this mode of symbolism in learning about communities and environments from the first grade onward.

Mapping is not the only dimension of macro-environmental learning which appears to emerge at a much earlier age than has been supposed. Our studies of conceptualization in toy-play in the 3-5 ages, of map-learning and associated cognitive learning in the first grade, and -- most important of all -- of cognitive learning applied to very theoretical concepts in the third grade, have suggested that young children are capable of dealing with macro-scale concepts from geography, social science, biology,

earth science, and history.

A macro-scale (or macro-environment) concept must involve, by definition, a scale and complexity of phenomenan sufficient to render the phenomenon incaccessible to ordinary ground-level perception, as a city block or entire city would be inaccessible to direct perception; hence a macro-scale concept involves some degree of cognitive integration: an aggregation of the whole from its scattered perceptual parts, a rotation of the whole to a map-like perspective, and, in representing the concept, a scale-reduction. There is no simple criterion to tell us when such a macro-scale concept has been acquired by the child -- we are here within the murky area which phillosophers refer to as "the meaning of meaning" -- but we can establish operational degrees of acquisition and understanding. For 3, 4, and five-year-old children, we determined that the ability to generate a macro-scale concept, or macro-environmental Gestalt, had been demonstrated if the child used a Gestalt word in describing a toy-assemblage or air photo, or if he performed navigational (maze) behavior calling for the spatial integration of meso-scale features (as going around the block requires the integration of several street segments), or if he constructed a macro-environmental Gestalt out of toys. Threes and fours were found to use a handful of macro-scale terms in free verbal description of toy assemblages and air photos -- we did no probing to exhaust their vocabularies -- and the majority were able to perform well on the construction and navigation tests. Fives were of couse even better in the verbal dimension. Thus we know that some amount of macro-environmental conceptualization is present before the age of school entrance, though (mapping aside) we do not know how much. Our best evidence comes from studies with first-through-fourth grade shcool children.

It was found that first-graders have no difficulty with the ordinary spectrum of macro-environmental terms-- works like "forest", "swamp," "town," and the like -- and none with the conceptualization of elementary macro-environmental relations, such as street networks, areas of cultivated and uncultivated land, and the like; little assistance was required from the teacher-investigator. Third-graders, however, were confronted with, and conquered, some very difficult geographic concepts, including the essential ideas of hydrographic and transportation networks, central-place hierarchies, localization of sites for factories, fire-stations, and the like, and invisible features such as political boundaries -- a concept that first-graders had some difficulty understanding. A study of home-range concepts among second and fourth-graders elicited corroborative evidence at these levels.

Hence it appears that children can deal with rather difficult macro-environmental concepts at unexpectedly early ages. These findings are nicely explained by our discoveries about cognitive mapping abilities at these ages. We may assume that imagery has much to do with macro-environmental learning, however important the symbolic component may be. We may therefore assume that a concept (or phenomenon) which has some properties that can be perceived directly by the child will be learned more easily, and earlier, than a concept which has few such properties or none. But a young child cannot ordinarily see his neighborhood, or city, or state as a whole: macro-scale concepts are generally inaccessible to his direct perception. If, however, he is accustomed to aggregating his perceptual experience in fantasy images and toy play, i.e., in cognitive mappings, then his understanding of the geographic scale of events will be vastly greater. And if, in teaching, we provide him with a perceptual surrogate such as an aerial photograph, we should see an otherwise quite unexpected learning capacity and rate, as though he were now walking instead of crawling.

Thus our most important finding has been the discovery that very young children (in every culture?) have a definite and effective strategy for learning about the larger pieces of the world, and our rather firmly corroborated theory as to what this strategy involves. We have elaborated the theory in other reports which are referenced in the project bibliography, below. Here we will merely argue the significance of environmental-learning theory for elementary education.

Every primary curriculum is built around an explicit or implicit model, and we argue that all the common models share an important defect, which (with apologies to Whitehead) we can call "the fallacy of misplaced scale." All apparently share the false assumption that a child cannot deal very well with large-scale things and processes, hence they select micro-scale concepts and examples, and only gradually, year by year, do most proceed from immediate experience to the larger world. Though gradual, the enlargement of scale is usually discontinuous and indirect: much of the macro-scale learning takes place after the child has begun to learn by manipulating the conventional symbols of written words and non-iconic maps; and much of it is thus a matter of learning from the symbol-meanings rather than from the child's perceptual experience. But a child, as we have shown in our research, is fully capable of handling the macro-world; has, in fact, a fine and effective strategy for doing so, combining the tactics of cognitive mapping with those of model-surrogate learning (as in toy-play) and ambulatory learning (as in exploration). Hence the fallacy. What makes this fallacy a matter of serious concern is the fact that much of the conceptual learning in early grades is nesessarily macro-scale learning.

This holds true for affect learning as it does for cognitive learning; for social science as for natural history and earth science. Some concepts simply have large referents: "community," for instance, is by no means learned at the same scale as "family." Ohter concepts are more easily exemplified in terms of macro-scale examples, as "Washington" somehow has much to do with an American child's understanding of citizenship. But equally important and far less obvious is the fact -- quite often forgotten in the design of developmental research -- that a child establishes the meaning of a micro-scale concept in part through its environment, or macro-scale context, and moreover learns most about its cause-and effect properties, its explanation, through this same space-time context. Therefore, curricula limited to micro-scale learning in the early grades are terribly slow, terribly incomplete, and terribly boring. Most curricula are more or less that.

Two curricular strategies emerge as salient applications of our findings. One is a matter of encouraging macro-environmental learning in the pre-school environment, and notably the kindergarten, so as to fully develop a child's ability to handle large-scale processes, then building on this ability in more formal learning during the early elementary grades. Involved here are problems of curriculum design for pre-school and lower elementary levels, design of the learning environment itself, and development of macro-environmental perceptual surrogates. The second major strategy is a matter of quite broadly redesigning the elementary curriculum to accomplish two related purposes: first, to enlarge the overall scale of concepts and examples while also increasing the gross emphasis on large-scale processes of society, the ecosystem, and the earth; the second is to deal with macro-scale processes in a way that elaborates the child's perceptual experience, instead of depending, as now, on the prior knowledge of reading and the indirect experience of symbolic reference. We have evidence that geography in particular and macro-environmental concepts in general can be taught at a rather sophisticated (and strongly motivating) level before a child has learned to read; hence, can be taught to children who have reading difficulties and thus fall behind in concept-learning and grow bored. The key is an approach which uses the child's own mode of environmental learning:exploration, model-surrogates, and cognitive maps.

Dissemination and Application

The findings of the Place Perception Project range across the spectrum from practical to theoretical, as foregoing sections of this report have demonstrated. As befits a project of this sort, the means chosen to disseminate the findings are equally broad. Although the primary mode is publication -- in unconventional as well as conventional forms -- there are a number of other modes, among them in-school demonstration, lectures, workshops, personnel training, and the like. The Place Perception Project is of course principally engaged in research, and implicitly in publishing the results of that research, but a considerable amount of effort has gone into the other modes of dissemination, as should be apparent in the following discussion, in which we deal with each mode in turn, to wit:

1. Conventional publication. This mode perhaps needs no discussion, since the 17 articles already published or accepted for publication, along with the other articles and books which should eventually reach publication, are listed in Appendix 1, the project bibliography (pp. 57-63). We have chosen quite deliberately to send much of our material to journals whose readership includes theoretical social scientists and environmental design personnel as well as educators. The Place Perception Research and other unconventional publication techniques discussed below are, on the other hand, directed specifically to teachers, teacher trainers, and others concerned primarily with eduaation.

2. Place Perception Research Reports. It was decided rather soon afer the project began that conventional publication would not disseminate our findings with sufficient speed to permit rapid application, thus greater usefulness as well as feedback. We therefore developed the Place Perception Research Reports, a series of offset monographs. Sufficient funds were available to publish eight reports prior to thisone (see Appendix 5), printing 300 copies of each -- a run sufficient to fill out a mailing to some 200 leaders in geographic education, though not, regretably, to leaders in other fields of macro-environmental education and elementary social studies. The list of 200 leaders was compiled with the aid of the National Council for Geographic Education. (See Appendix 4, a letter from the NCGE which was sent to recipients of the reports.) The PPR Reports series is continuing: Nos. 9 through 13 will almost certainly be published before the end of 1971, Nos. 14 and 15 should be completed in early 1972, and some reprinting is planned. (The reports-in-progress are listed in Appendix 1, the project bibliography.) Parenthetically, although we disseminated the early reports as unpublished documents, we found them to be referenced so frenquently as publications that we now define them as such.

3. Manuals, kits, and transparencies. One of the most important dissemination projects is a teacher's manual, now in preparation (item 45 in the bibliography below). It will present all of the practical and useable results of the project in the form of a large-format paperback book with examples of perceptual surrogates, such as aerial photographs, and instructions for obtaining, modifying, and making such surrogates in one's own school district. Other manual-like publications include the forthcoming bibliography on cartographic education (PPR Report No. 13) and three teacher-oriented articles (items 43, 50, and 51 in the project bibliography) which are being prepared for submittal to the Journal of Geography. A related mode of dissemination is the kit of aerial photographs. Initially, three are being assembled: a kit for first-grade map-learning, one for macro-environmental concept-learning at the lower elementary level, and one specifically for elementary geography and macro-environmental studies in, and about, Puerto Rico. The Puerto Rican kit will be integrated to some extent with a parallel project, a school atlas of Puerto Rico which the Department of Geography of the University of Puerto Rico has begun to develop. The atlas will include air photos, photo-maps, and other PPP-derived perceptual surrogates as well as conventional maps. And related to this project, in turn, is a proposal by the Department of Geography to develop air photos and other surrogates in the form of transparencies for reproduction by the Department of Public Instruction and distribution to th schools of Puerto Rico; a parallel project is to begin soon under ERG auspices on the mainland.

4. Institutes and Workshops. We of course recognize the need to organize teacher's institutes as a means of disseminating the results of the Place Perception Project, but project funds have not permitted us to do so. Much attention was given to the PPP techniques, however, during two NDEA institutes in which PPP personnel participated: one in Puerto Rico and one in Brazil. There have been several workshops, some of which were assemblages of leaders in geographic education and some of which were training projects for teachers of teachers, in which PPP materials were discussed and demonstrated. Among the former were a workshop of the NCGE's Task Force for Geographic Education, held at Peabody College, Nashville, and one of the Commission on Geographic Education of the Association of American Geographers, held at the University of Michigan, Ann Arbor. Among the latter were the AAG's Bromwoods Conference for college teachers of geography and several workshops and seminars involving TTT participants at Clark. A significant workshop for leaders in environmental education and for planners concerned with this field -- educational planners, designers of educational, recreational, and other learning environments, and the like -- is to be held in conjunction with the annual meeting of the Environmental Design Research Association in Los Angeles, January, 1972. The workshop, which deals with critical issues related to the environmental behavior of children and the

relevance of these issues to environmental education and design, is organized by Roger Hart and L. Solomon with the participation of Leonard Mark, Maureen McGee, Mark Lynch, David Stea, J. M. Blaut, and others of the project. Perhaps this is the closest approach to an institute-like mode of dissemination, although mentionshould be made of the continuing "Environmantal Education Working Group" in the School of Planning, Univesity of California at Los Angeles, of which David Stea is Co-Director.

5. <u>In-School Projects: Demonstration and Diffusion.</u> Since the Place Perception Project has thus far been concerned primarily with research, and is not a curriculum project or comparable endeavor, a systematic effort to inject the results of our work directly into the schools has not been made. Nevertheless, rather exciting use is indeed being made of our findings in several school systems. Such in-school use includes demonstration efforts of project personnel and spontaneous efforts -- a king of diffusion-by-induction -- organized by others. Among the former, mention should be made of Roger Hart's work in Vermont with the school systems of Wilmington, Windham, and Montpelier, the Deerfield Valley regional elementary school, and the statewide "Vermont Learning Experiment," all of which have begun to make classroom use of PPP surrogates and techniques with Hart's guidance. A parallel effort is being organized by J. M. Blaut in Puerto Rico. Thus far limited to the Universiry of Puerto Rico Experimental School, the activity shoul expand to the public kindergarten program, with which PPP has in in the past collaborated, and to the public elementary schools. The Santa Monica Region school system in California is also applying PPP materials and techniques under stimulus of Peter Orleans and, latterly, David Stea. Diffusion of a spontaneous sort can be recorded for many of the schools and school systems in which the project has worked, including schools of St. Vincent, Worcester (notably Chandler, Woodland, and Elm Park Community schools), and elsewhere; Santa Monica Regional can also be recorded as spontaneous adoption; and the same is no doubt true for other schools and systems, many of which have received our publications.

6. <u>Training of Educational Personnel.</u> Much has been accomplished in the sphere of preparing educatinnal professional personnel, both pre-service and in-service, apart from the institutes and workshops mentioned above. Our greatest impact has perhaps resulted from the fact that many graduate and undergraduate students of geography have become motivated to specialize in the field of geographic and macro-environmental education and most often in the particular field of research in children's environmental learning as a specialized aspect of education. While the need for educational personnel in all aspects of geographic and macro-environmental education is great indeed, we believe that the need is in one sense most crucial in the area of research personnel, since so very little knowledge is available for

curriculum design and since so few young research minds are attracted in this direction in the absence of a stimulus such as the PPP provides. Thus we may list some 18 graduate students and 17 undergraduates who worked with us in the project (see Appendix 3), may also note that two doctoral dissertations and six masters theses have been or are being written in connection with the project, and may finally note that several dozen graduate students and several hundred undergraduates have had strong exposure to the project in courses at Clark and elewhere.

7. Lectures and Symposia. Project personnel have reported our findings, formally or informally, in sessions and symposia at the following professional meetings:

National Council for Geographic Education:
- Kansas City (1968 annual meeting)
- Houston (1969 annual meeting)
- Detroit (1970 annual meeting)

Association of American Geographers:
- Bridgewater (1969 New England meeting)
- San Francisco (1970 annual meeting)

American Psychological Association
- Miami (1970 annual meeting)
- Boston (1970 New England meeting)
- Washington (1970 annual meeting)

Environmental Design Research Association
- Pittsburgh (1971 annual meeting)
- Los Angeles (1972 annual meeting, forthcoming)

And finally, project personnel have delivered project-related lectures at the following institutions:

Arizona State University.
City University of New York
Clark University
Columbia University
Hebrew University
Johns Hopkins University
Massachusetts Institute of Technology
North Carolina State University
Pennsylvania State University
Rutgers University
University of California at Los Angeles
University of Grenoble
University of Illinois at Chicago Circle
University of London
University of Montreal
University of Puerto Rico.

Project funds were used for very few of these lectures, and for none of those given outside of the United States. All of the lectures helped to disseminate the findings of the Place Perception Project.

FIGURES

(pages 50-56)

Figure 1. Aerial photograph of part of Worcester, Massachusetts, used in Third Grade Experimental Curriculum (Project 7). A photograph of the area enlarged to 3' X 3' was used in the test of three-year-old's ability to interpret and use aerial photographs (Project 28).

Figure 2. Sketch map of the activity space of pre-school-age children of a rural household in St. Vincent, West Indies. This map was used as a base for sketching and noting activity patterns and space use (Project 37.)

Figure 3. Base map for the age-specific land use study of Barranquitas, P. R. (Project 34.)

Figure 4. Sktech of a wheeled toy constructed and used by boys in rural St. Vincent; part of the toy inventory and analysis of Project 35.

Figure 5. Graph of scores in the three-to-five-year-old toy-play test of cognitive mapping in Worcester (Project 19). The verbal score is a measure of the child's ability to use macro-environmental words and word-strings; the maze score is based on solution of a navigation problem in the child's constructed toy landscape; the composite score (CL) is a panel judgment of the veridicality of the toy landscape.

Figure 6. Pre-test and post-test map, utilizing standard topographic symbols, which was employed in the first-grade experimental curriculum in map learning (Project 6). Boylston, Mass.

Figure 7. Examples of toy patterns obtained from Puerto Rican Kindergarten children in Project 47.

FILMED FROM BEST AVAILABLE COPY

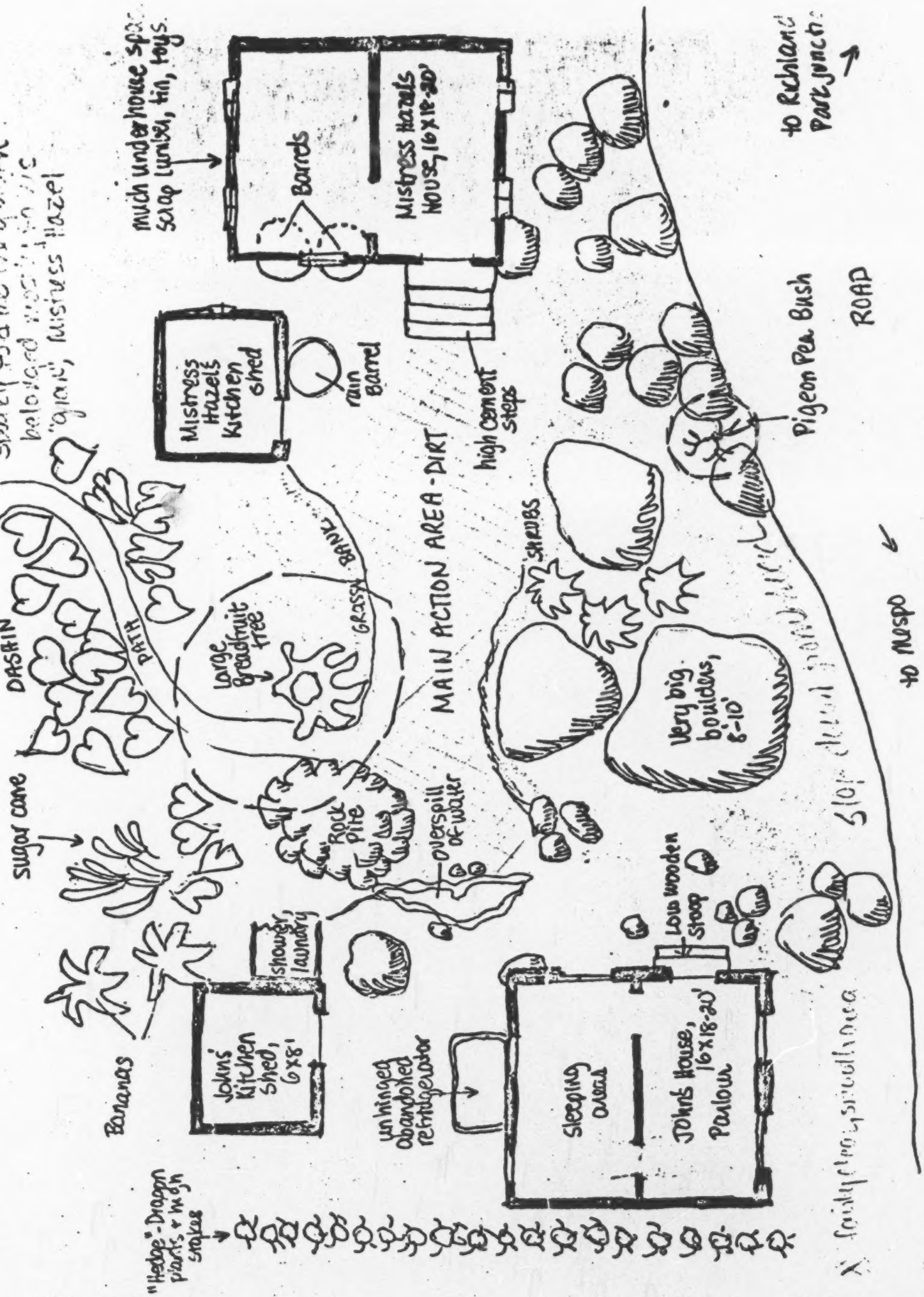
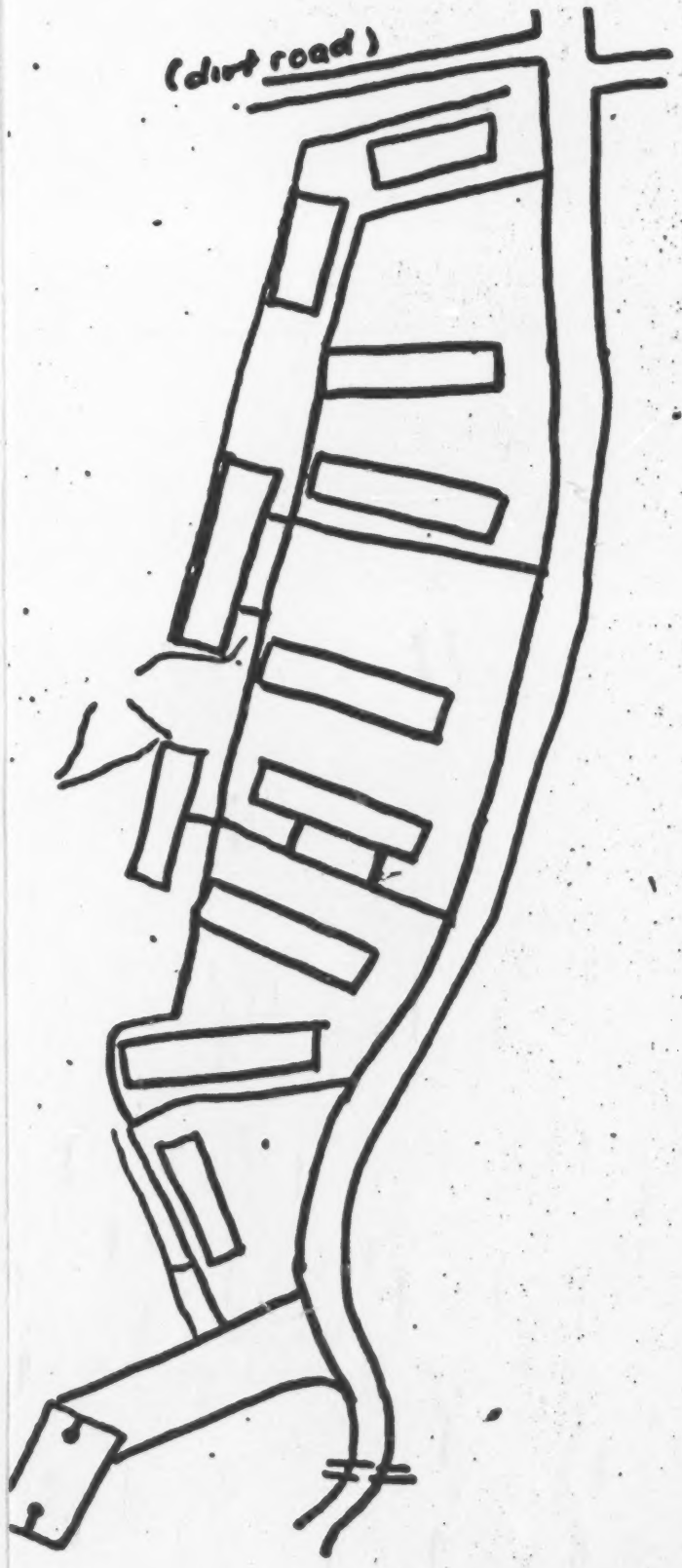


Figure 2



KEY:
— road
— path
⊞ church
P school
⊞ hospital
end of study area

BARRANQUITAS
CHILD LAND USE
BASE MAP, PART II

PLACE PERCEPTION PROJECT
CLARK UNIVERSITY

Figure 3

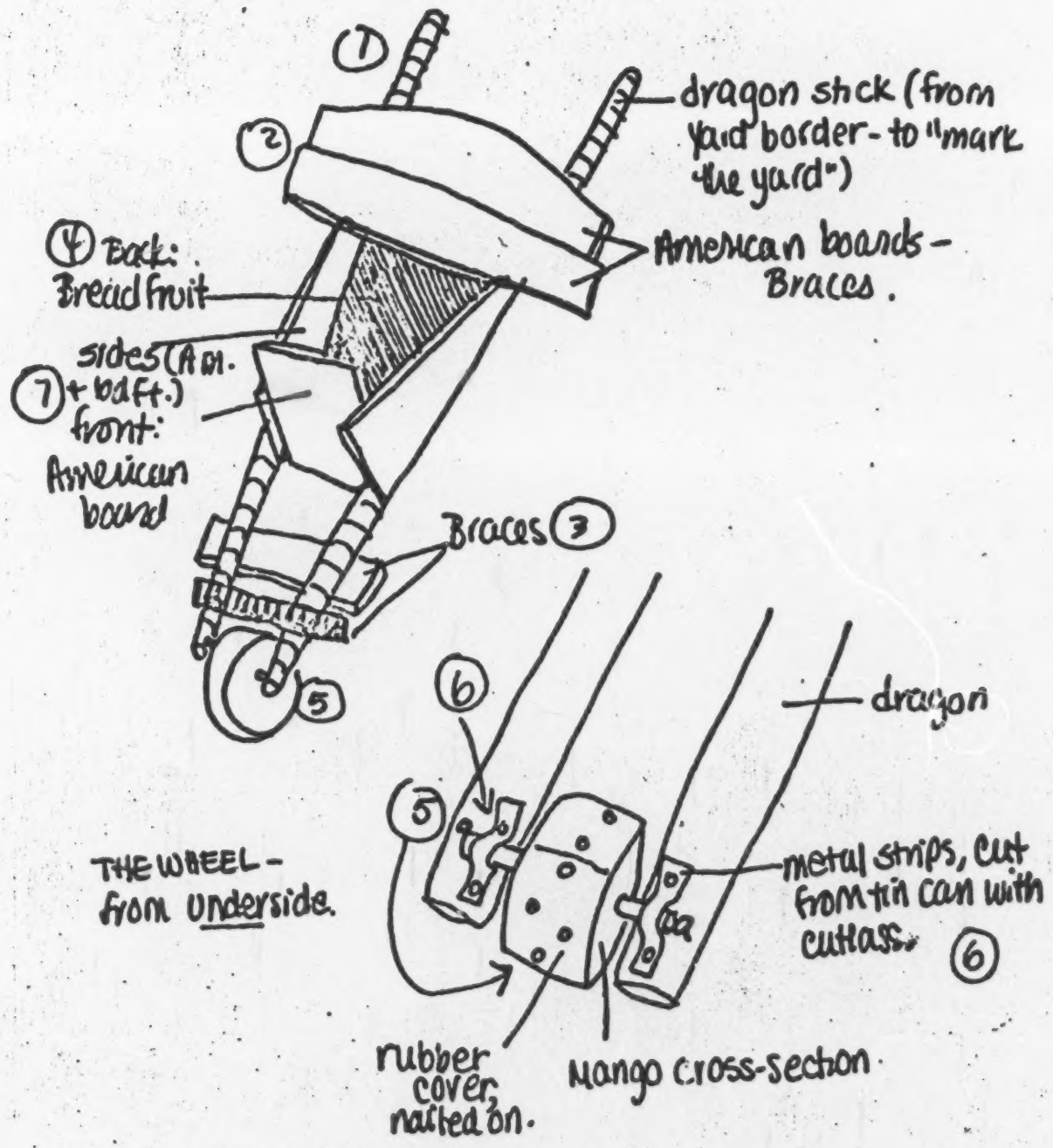

(1)
dragon stick (from yard border - to "mark the yard")
(2)
American boards - Braces.
(4) Back: Breadfruit
sides (Am. (7) + bd ft.)
front: American board
Braces (3)
(5)
(6)
dragon
(5)
THE WHEEL - from Underside.
metal strips, cut from tin can with cutlass. (6)
rubber cover, nailed on.
Mango cross-section.

Figure 4

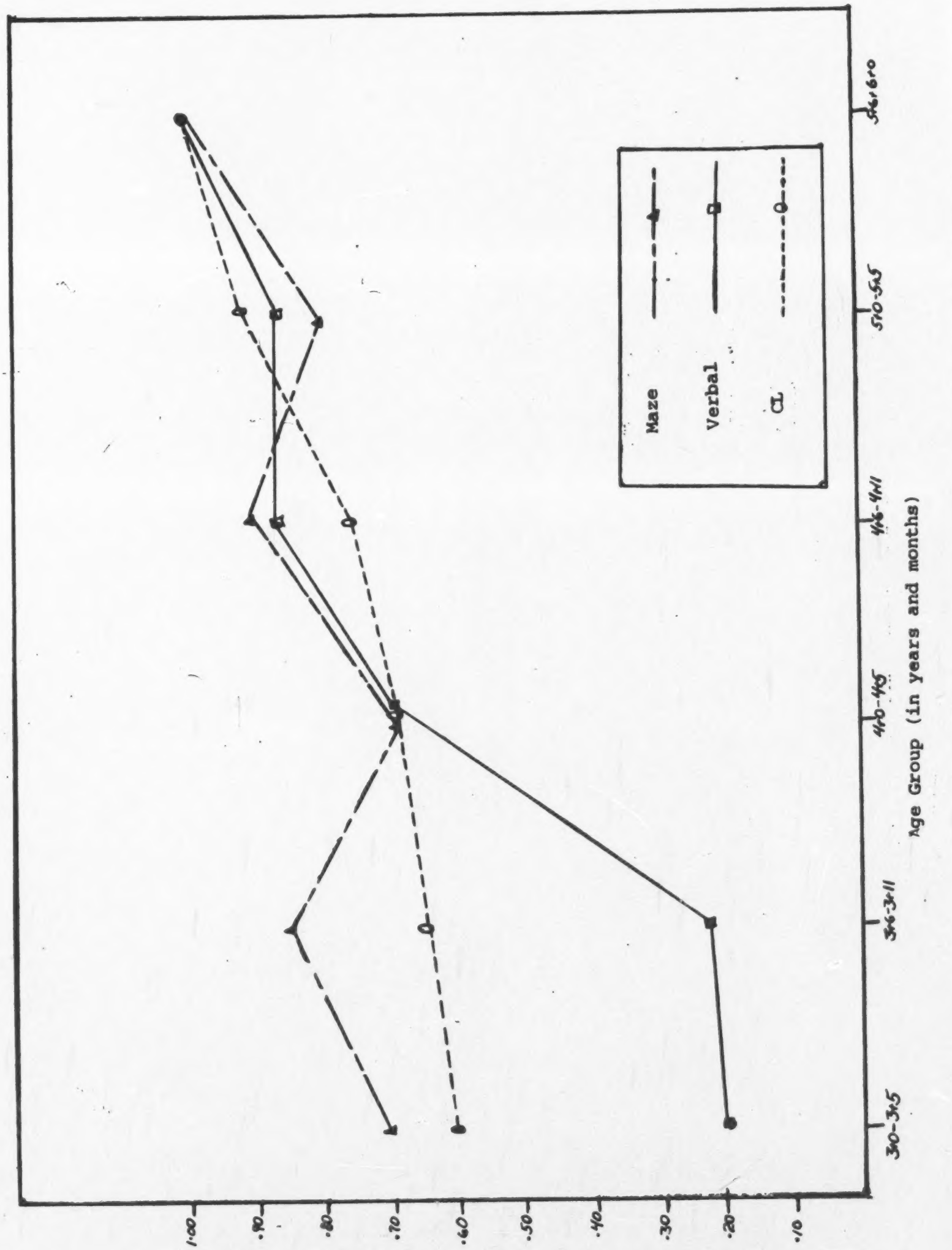
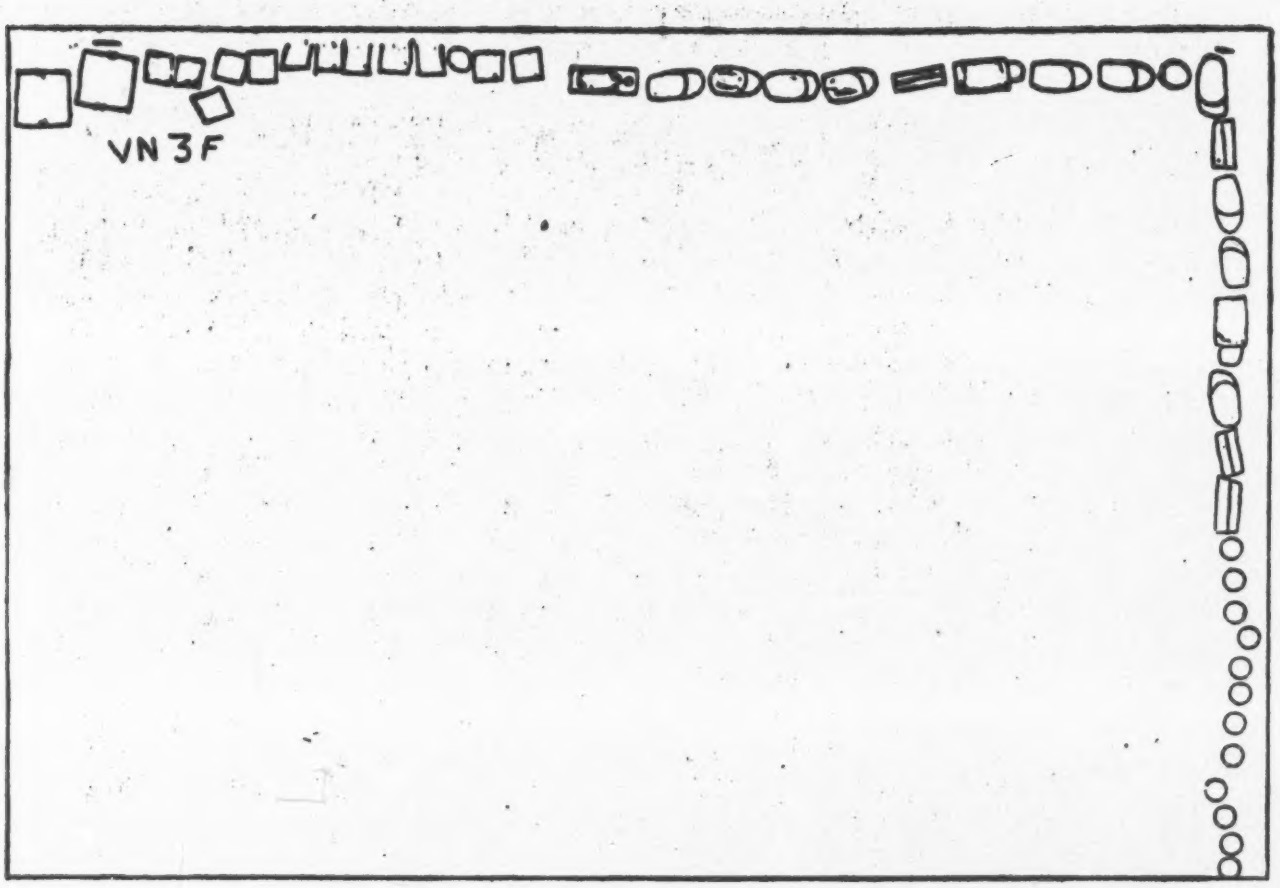
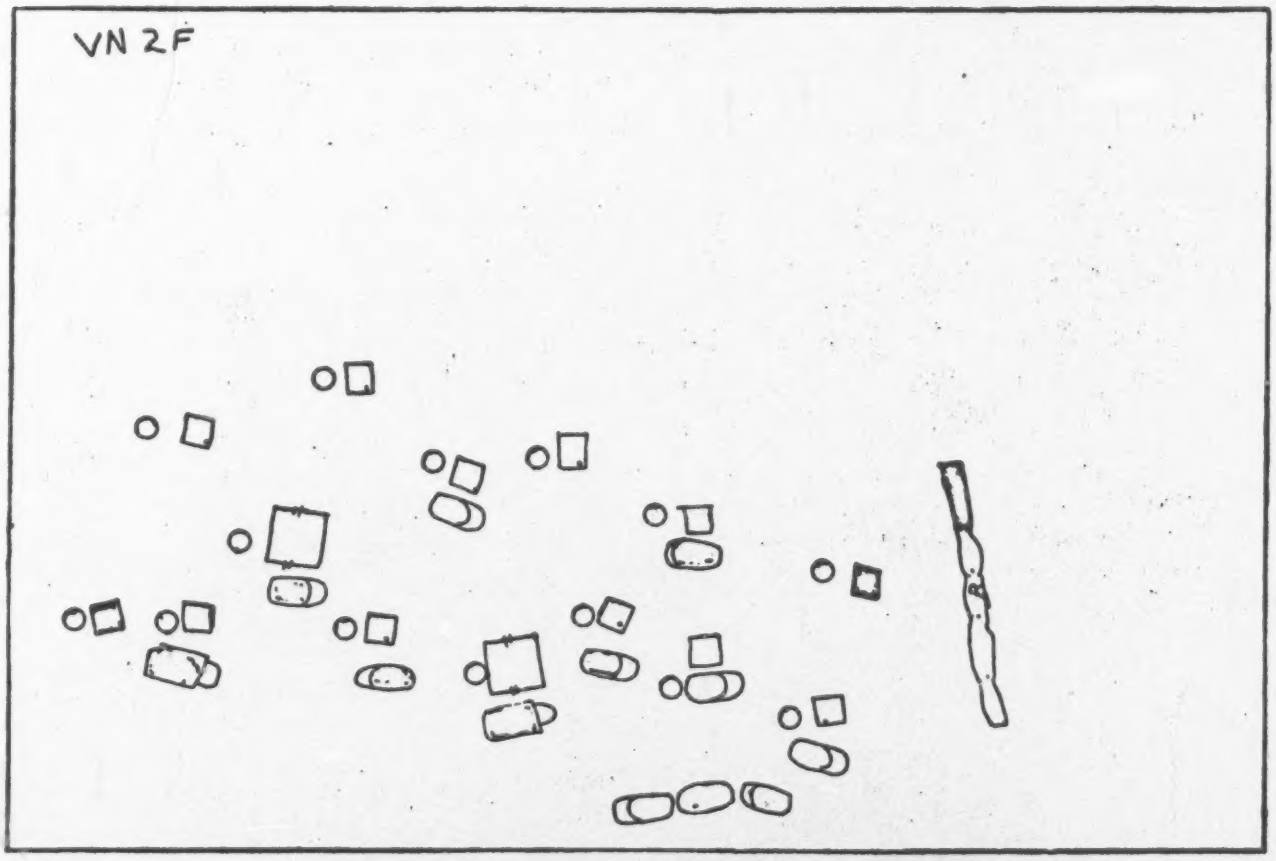

Maze
Verbal
CL
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
Score at Age X as Percent of Score at Highest Age
Age Group (in years and months)
16-19
20-25
26-29
30-35
36-39
40-45
46-49
50-55
56-60

Figure 5





Two examples of patterns created by five-year-olds (Villa Novarez, Rio Piedras, Puerto Rico) in the environmental toy-play test. The pattern in Figure 6 is indicative either of a pre-environmental-organization phase of development or of a simple aesthetic preference. The pattern of Figure 7, on the other hand, shows clear environmental organization. (The community is suburban; the pattern is almost an idealized suburb with its repeated house-car-tree association.)

Figure 6

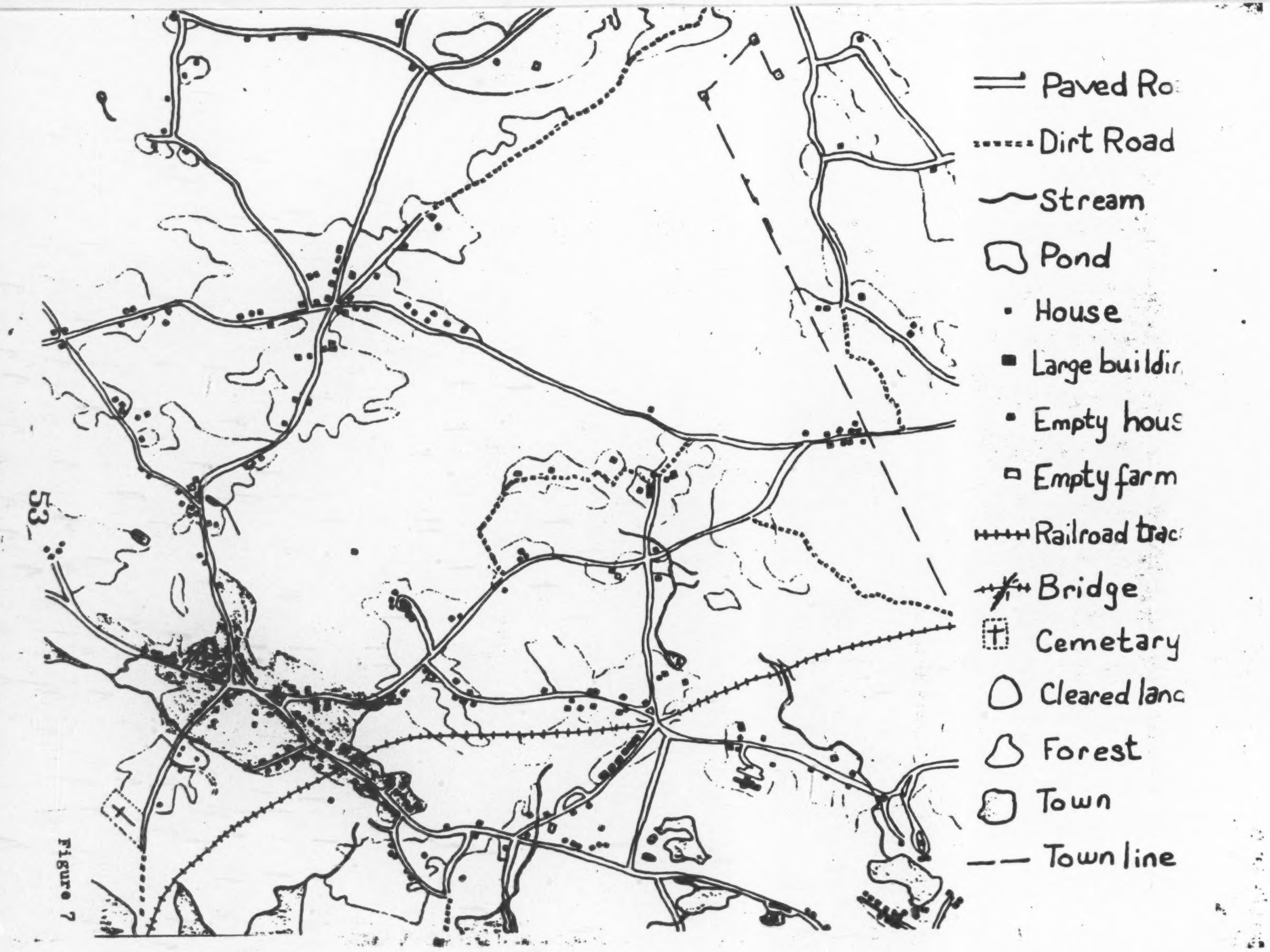

Paved Ro
Dirt Road
Stream
Pond
House
Large buildir
Empty hous
Empty farm
Railroad trac
Bridge
Cemetary
Cleared lanc
Forest
Town
Town line

Figure 7

Appendix 1.

BIBLIOGRAPHY OF PUBLICATIONS AND REPORTS

This bibliography includes publications, articles and books in press and accepted for publication, articles submitted for publication, Place Perception Research Reports, manuscript reports including articles to be submitted for publication, and (in Part B of the bibliography) works in progress. Items marked with an asterisk (*) do not reflect work supported to any significant extent by OE Grant OEG080807724493, but do reflect some degree of project input.

A. Completed Materials

1. Anderson, Jeremy, and Tindal, Margaret. "The Concept of Home Range: New Data for the Study of Territorial Behavior." To be presented at the 1971 annual meeting, National Council for Geographic Education.*

2. Blaut, J. M. "All the Houses of People Who Live There." Chapter in a forthcoming volume of essays in honor of Fred B. Kniffen. Jess Walker, ed. Louisiana State University Press, late 1971.

3. _____."Final Report: Studies of Place Perception in Elementary and Pre-School Education." To be published as Place Perception Research Reports, No. 9, "The Place Perception Project: Final Report and Bibliography." Chicago: Environmental Research Group, late 1971.

4. _____. "Space, Structure, and Maps." Tijdschrift voor Economische en Sociale Geografie, 62 (1971).

5. _____. "Studies in Developmental Geography." Place Perception Research Reports, No. 1. Worcester, Mass.: Place Perception Project, Clark University, 1969.

6. _____. "A Theory of Peasant Land-Use Behavior." Read at the Bi-National Conference of Israeli and American Geographers, Jerusalem, 1969. Forthcoming in the Proceedings of the conference (Jerusalem: Hebrew University, probably 1972).

7. Blaut, J. M., and Knight, Gregory. "Ethnogeographic Models." Paper to be submitted for publication to the Annals, Association of American Geographers, late 1971.

8. Blaut, J. M., McCleary, G. F., Jr., and Blaut, América S. "Environmental Mapping in Young Children." Environment and Behavior, 2 (1970): 335-349.

9. Blaut, J. M., and Stea, David. "Place Learning." Place Perception Research Reports, No. 4. Worcester, Mass.: Place Perception Project, Clark University, 1969.

10. Blaut, J. M., and Stea, David. "Studies of Geographic Learning." Annals, Association of American Geographers, 61 (1971): 387-393.

11. Blaut, J. M., and Stea, David. "A Toy-Play Test of Cognitive Mapping in Three- to Five-Year Old Children." To be submitted to Developmental Psychology, late 1971.

12. Chang, Carl. "Parameters in the Psychophysical Law: An Analysis of their Application to Cartographic Problems." Unpublished Masters thesis, Clark University, 1969. To be published as Place Perception Research Report No. 12 (tentative title: "Psychophysical Parameters of Map Perception").

13. Dent, Borden. "Perceptual Organization and Thematic Map Communication." Unpublished Ph.D. dissertation, Clark University, 1970. Reprinted as Place Perception Research Report No. 5.

14. Hart, Roger. "Aerial Geography: An Experiment in Elementary Education." Unpublished Masters thesis. Published under the same title as Place Perception Research Report No. 6.

15. Hart, Roger, and Moore, Gary T. "Critical Issues in the Environmental Behavior and Environmental Learning of Children."To be presented as introductory paper for a symposium, "Environmental Behavior of Children," at the Environmental Design Research Association annual meeting, Los Angeles, 1972, and published in the Proceedings of the meeting.

16. Hart, Roger, and Moore, Gary T. "The Development of Spatial Cognition: A Review." Place Perception Research Reports, No. 7. Worcester, Mass.: Place Perception Project, Clark University, 1971.*

17. Mark, Leonard. "Modelling through Toy-Play: Methodology for Eliciting Topographical Representations in Children." To be read at the Environmental Design Research Association annual meeting, Los Angeles, 1972; publication in the Proceedings of the meeting or in Place Perception Research Report No. 15 ("Working Papers in Place Perception, 1970-71"), Chicago: ERG, mid-1972.

18. Muir, Merrie. "The Use of Aerial Photographs as an Aid in Teaching Map Skills in the First Grade." Unpublished Masters thesis, Clark University, 1970. Published as Place Perception Research Report No. 3, Worcester, Mass.: Place Perception Project, Clark University, 1970, under the same title.

19. Muir, Merrie, and Blaut, J. M. "The Use of Aerial Photographs in Teaching Mapping to Children in the First Grade: An Experimental Study." The Minnesota Geographer, 22, 3 (1970): 5-21 (special issue incorporating the Proceedings of the Panel on Research in Geographic Learning held at the annual meeting of the National Council for Geographic Education, Houston, 1969).

20. Stea, David. "Geotherapy and the Morality of the Environment." Submitted for publication to Landscape, 1971.

21. _____. "Home Range and Use of Space." In: Pastalan, L. A., and Carson, Daniel, eds. Explorations of Spatial Behavior Relations as Related to Older People. Ann Arbor: University of Michigan Institute of Gerontology, 1970.*

22. Stea, David, Carson, Daniel, and Wisner, Benjamin. "Navajo Color Categories and Color Discrimination: An Experiment in the Relation between Language and Perception." Proceedings, 12th Congress, Inter-American Psychological Society, Montevideo (in press).

23. Stea, David. "On the Metrics of Conceptual Space: Distance and Boundedness in Psychological Geography." Proceedings, 12th Congress, Interamerican Psychological Society, Montevideo, Uruguay (in press).

24. Stea, David. "Some Notes on Orientation." In Place Perception Research Report No. 2 ("Working Papers in Place Perception, 1969"), Worcester, Mass.: Place Perception Project, Clark University, 1969.

25. Stea, David, ed."Working Papers in Place Perception, 1969." Place Perception Research Reports, No. 2, Worcester, Mass.: Place Perception Project, Clark University, 1969.

26. Stea, David, and Blaut, J. M., "Explorations into the Role of Toy Play in Children's Landscape Modelling." To be read at the Environmental Design Research Association annual meeting, Los Angeles, 1972, in the symposium on "Environmental Behavior of Children," and to be published in the Proceedings of the meeting.

27. Stea, David, and Blaut, J. M. "Notes Toward a Developmental Theory of Spatial Learning." Read at the annual meeting of the Environmental Design Research Association, Pittsburgh, 1970. Forthcoming in: David Stea and Roger Downs, ed., Cognitive Mapping: Images of Spatial Environments,*Chicago: Aldine-Atherton, in press.

28. Stea, David, and Blaut, J. M. "Some Preliminary Observations on Spatial Learning in Puerto Rican School Children." Forthcoming in Stanford Gerber, ed., The Family in the Caribbean, II: Proceedings of the Aruba Conference, Río Piedras, Puerto Rico: University of Puerto Rico Press (Instituto de Estudios del Caribe), late 1971.

29. Stea, David, Blaut, J. M. Bloom, Jill, Kasnitz, Deborah, Mark, Leonard, and Lynch, Mark. "Toy Geography: Explorations into the Role of Toy Play in Early Environmental Learning." Place Perception Research Report No. 10, Chicago: Environmental Research Group, in press.

30. Stea, David, and Downs, Roger. "From the Outside Looking in at the Inside Looking Out." Environment and Behavior, 2, 1 (1970): 3-12 (special issue: D. Stea and R. Downs, eds. Cognitive Representations of Man's Spatial Environment),*

31. Stea, David, and Downs, Roger. "Introduction" to: D. Stea and R. Downs, eds. Images of Man's Spatial Environment. Chicago: Aldine-Atherton, in press.*

32. Stea, David, and Wood, Denis."A Cognitive Atlas: Explorations into the Psychological Geography of Four Mexican Cities." Forthcoming as Place Perception Research Report No. 11, Chicago: Environmental Research Group, late 1971. Also forthcoming in translation:Mexico, D. F.: Instituto Nacional de Antropología e Historia, probably 1972.*

33. Stewart, Reed. "Troubling Textbooks." Antipode 1 (1969): 34-37.*

34. Tindal, Margaret. "The Home Range of Black Elementary School Children: An Exploratory Study in the Measurement and Comparison of Home Range." Unpublished Masters thesis, Clark University, 1971. Published under the same title as Place Perception Research Report No. 8, Chicago: Environmental Research Group, 1971.

35. Wisner, Benjamin. "Learning to Be a Farmer in St. Vincent, West Indies: Report of Some Pilot Observations." Manuscript report to be incorporated in: J. M. Blaut, ed., "Environmental Learning in a West Indian Rural Community: Pilot Data for a Cross-cultural Study of Environmental Behavior in Children." Place Perception Research Report No. 14, Chicago: Environmental Research Group, early 1972.

36. Zerner, Charles. "Notes on Toy Play, Toy Construction, and Play Fantasies: A Study of the Play Behavior of St. Vincent Children within the Context of Place Perception Theory." Manuscript report to be incorporated in: J. M. Blaut, ed. "Environmental Learning in a West Indian Rural Community: Pilot Data for a Cross-Cultural Study of Environmental Behavior in Children. Place Perception Research Report No. 14, Chicago: ERG,early 1972.

37. Bloom, Jill."A Microgeographic Study of Children." In: D. Stea, ed. "Working Papers in Place Perception, 1969." Place Perception Research Report No. 2, Worcester: PPP, Clark University, 1969.

38. Bullock, Roger. "Direction-Giving and Environmental Perception." In: Ibid.

39. Garside, Caroline, and Soergel, Marilyn. "Children's Environmental Perception and Behavior in a City Park." In: Ibid.

Materials in Preparation

40. Blaut, J. M., ed. "Environmental Learning in a West Indian Rural Community: Pilot Data for a Cross-Cultural Study of Environmental Behavior in Children." Place Perception Research Report No. 14. To be completed and published (Chicago: Environmental Research Group) in early 1972.

41. Blaut, J. M. "Nice Place Theory." Seminar paper on value-mapping. To be revised and published in Place Perception Research Report No. 15, "Working Papers in Place Perception, 1970-71," Chicago: ERG, 1972.

42. Blaut, J., and Stea, D. Environmental Learning. (Book describing the Place Perception Project.) Aldine-Atherton, probably 1972.

43. Blaut, J. M., and Stea, David. "Place Perception and Geographic Learning in Kindergarten and the Lower Elementary Grades." A paper describing applications of the project to elementary education in geography. To be completed and submitted to Journal of Geography, early 1972.

44. Blaut, J. M., Stea, David, and Hart, Roger. Air-Photo Kits. Materials are being assembled and tested for several kits, including one for first-grade map-learning, one for elementary macro-environmental concepts, one for elementary schools of Puerto Rico.

45. Blaut, J. M., Stea, David, and Hart, Roger. Environmental Imagery in Elementary Education: A Teacher's Manual. This is to be a large-format paperback book, with perceptual surrogates, the aim of which is to present the educationally useful findings of the Place Perception Project to elementary and pre-school personnel.

47. Bloom, Jill, and Briggs, Cynthia. A report on observations of young children's environmental play in St. Vincent. Chapter in item 40, above.

48. Dronsick, David, and McCleary, George F., Jr. "A Bibliography of Cartographic Education." To be published as Place Perception Research Report No. 13, late 1971.

49. El Gammal, Farouk, Blaut, J. M., and others. School Atlas of Puerto Rico. The Department of Geography, University of Puerto Rico, has begun work on this elementary-school atlas which will draw heavily on the findings and innovations of the Place Perception Project.

50. Hart, Roger, and Blaut, J. M. "Aerial Photographs and Macro-environmental Concepts in the Third Grade" (tentative title). A summary and elaboration on R. Hart's Master's thesis; to be submitted to the Journal of Geography, early 1972.

51. Blaut, J. M.,and Hart, Roger. "The Flying Classroom in Elementary Education." Summary of studies undertaken by Blaut and Hart on the subject. To be submitted to Jounral of Geography early 1972.

52. Stea, David, Blaut, J. M., and others. "Toy Play and the Development of Environmental Cognition in Pre-School Children." Full report of the toy-play studies, emphasizing theoretical implications. To be submitted to Annals, Association of American Geographers, early 1972.

53. Thompson, Karen. "Map Lettering as a Quantitative Symbol." Masters thesis in preparation; may be published as a Place Perception Research Report.

Appendix 2.

PROJECT PARTICIPANTS AND COLLABORATORS

Included in this list are project participants -- those who worked formally on the project -- along with others who assisted in various ways, including research, advising, and dissemination.

Jeremy Anderson, Ph.D., Consultant (Geography) and Research Associate
Ann Bates-Gee, B.A., Administrator and Editor
Zaida Bérrios, M.A., Research Assistant
América Blaut, B.A., Research Associate
J. M. Blaut, Ph.D., Co-Director
Jill Bloom, Research Assistant (Undergraduate)
Cynthia Briggs, Research Assistant (Undergraduate)
Roger Bullock, Research Assistant (Undergraduate)
Sharon Cantor, Research Assistant (undergraduate)
Daniel Carson, Ph.D., Consultant (Psychology, Film) and Research Associate
Carl Chang, B.A., Research Assistant (Graduate)
William Clark, B.A., Research Assistant (Graduate)
Borden Dent, Research Associate (Graduate)
Roger Downs, Ph.D. Consultant (Geography)
David Dronsick, B.A., Research Assistant (Graduate)
Caroline Garside, B.A., Collaborator
Andrew Goldman, B.A., Research Assistant (Graduate)
Kathleen Gooding, B.A., Collaborator
Linda Gurvitz, Research Assistant (Undergraduate)
Kirsten Haring, B.A., Collaborator
Roger Hart, M.A., Research Associate (Graduate)
Jeffrey Hausner, Research Assistant (Undergraduate)
Deborah Kasnitz, Research Assistant (Undergraduate)
Gregory Knight, Ph.D., Consultant (Ethnogeography)
Thomas Koch, Research Assistant (Undergraduate)
Katherine Lawrence, Research Assistant (Undergraduate)
Ann Lewis, Research Assistant (Undergraduate)
Mark Lynch, Research Assistant (Undergraduate)
Leonard Mark, Research Assistant (Undergraduate)
Irene Mauro, B.A., Research Assistant and Editor
Bernard May B.A., Research Assistant (Graduate)
George F. McCleary, Jr.,Ph.D., Co-Director
Lucy McDowell, Research Assistant (Undergraduate)
Maureen McGee, Research Assistant (Undergraduate)
David Miller, B.A., Research Assistant (Graduate)
Gary Moore, M.A., Collaborator

Merrie E. Muir, B.A., Research Assistant (Graduate)
Andrea Nelson, Research Assistant (Undergraduate)
Thomas Nickerson, Research Assistant (Undergraduate)
Roberta Norin, B.A., Research Assistant (Graduate)
Peter Orleans, Ph.D., Collaborator
William Pattison, Ph.D., Consultant (Geographic Education)
Richard Pond, B.A., Research Assistant (Graduate)
Thorne Shipley, Ph.D., Consultant (Psychology)
Marilyn Soergel, M.A., Collaborator
Howard Stanton, Ph.D., Consultant (Sociology)
David Stea, Ph.D., Co-Director
Reed Stewart, M.A., Research Assistant (Graduate)
Karen Thompson, B.A., Research Assistant (Graduate)
Margaret Tindal, B.A., Research Assistant (Graduate)
David Weaver, Research Assistant (Undergraduate)
Robert Wesner, Ph.D., Consultant (Psychology, Editing)
Susan Willoughby, M.A., Research Assistant (Graduate)
Benjamin Wisner, M.A., Research Assistant (Graduate)
Denis Wood, B.A., Research Assistant (Graduate)
Ingrid Wood, B.A., Collaborator
Charles Zerner, B.A., Research Assistant (Graduate)

Appendix 3.

COOPERATING SCHOOLS AND SCHOOL SYSTEMS

School Systems

Baltimore, Md.
Boylston, Mass.
Montpelier, Vt.
Parole, Md.
Puerto Rico
Santa Monica Region, Cal.
Vermont("Vermont Learning Experiment")
Worcester, Mass.

Schools, Kindergarten, etc.

Barranquitas, P.R. (Head Start Rural Program)
Boylston, Mass., Elementary Schools
Caparra Heights, P. R., Elementary School
Chandler St. Elementary School, Worcester, Mass.
Canterbury St. Elementary School, Worcester, Mass.
Dorado, P.R., Kindergarten
Downing St. Elementary School, Worcester, Mass.
Deerfield Valley Regional School, Wilmington, Vt.
Edgebrook Daycare Center, Natick, Mass.
Edwards St. Daycare Center, Worcester, Mass.
Elm Park Community School, Worcester, Mass.
Harlem Park School, Harlem Park, Md.
Humpty Dumpty Daycare Center, Worcester, Mass.
Juana Matos, P.R., Kindergarten
Little Bo Peep Daycare Center, Worcester, Mass.
Mesopotamia, St. Vincent, Elementary School
May St. Elementary School, Worcester, Mass.
New School (Elementary), Auburn, Mass.
Palos Blancos Kindergarten, P.R.
Richmond Park, St. Vincent, Elementary School
Paxton, Mass., Elementary School
St. Agnes Guild Daycare Center, Worcester, Mass.
University of Puerto Rico Experimental School, Río Piedras, P.R.
Villa Nevarez Elementary School and Kindergarten, Río Piedras,P.R.
Webster Square Daycare Center, Worcester, Mass.
Whitinsville, Mass. Elementary School
Windham, Vt., Elementary School
Winslow St. Elementary School, Worcester, Mass.
Woodland St. Elementary School, Worcester, Mass.

Appendix 4.

Preliminary Evaluation of Aircraft Suitable for Use as "Flying Geography Classroom"

Each aircraft carries pilot, copilot-teacher, and stated number of children at K-6 and 7-12 levels (estimated capacity, optimum configuration with side-facing seats and enlarged window area on one side of fuselage).

Make and Model	No. of Children		Power Plant	Characteristics
	K-6	7-12		
Helio Courier Model H-250	5	4	250 HP 1 engine	Specialized short-take-off-and-landing (STOL) aircraft. Stall-free. Only single-engine aircraft considered suitable.
Cessna "Skymaster" 337	6	5	420 HP 2 engines	High-wing; slow-flight capability. Low cost but small capacity.
Britten-Norman "Islander" (British)	15(?)	11	500 HP 2 engines	High-wing; slow-flying. Low cost for capacity.
Short "Skyvan" (British)	20(?)	15(?)	1200 SHP 2 engines Turboprop	High-wing; slow-flying.
DeHavilland of Canada "Twin Otter"	30	25	1200 SHP 2 engines Turboprop	High-wing; slow-flying.
DeHavilland of Canada "Caribou"	45	35	2900 HP 2 engines	High-wing; slow-flying.
Israel Aircraft Corp. "Arava"	35	30	2 engines Turboprop	High-wing; slow-flying.

Appendix 5.

Letter from the President of the National Council for Geographic Education to 200 leaders in geographic education to whom the Place Perception Research Reports were transmitted as a means of rapidly deisseminating Place Perception Project findings and recommendations.

Dear Leader in Geographic Education:

As President of the National Council for Geographic Education, I take pleasure in introducing you to the Place Perception Project, an undertaking at Clark University sponsored by the U. S. Office of Education. Two reports have been mailed to you under separate cover by the project, free of charge. They are

"Studies in Developmental Geography." J. M. Blaut. October, 1969.

"Working Papers in Place Perception, 1969." David Stea and others. November, 1969.

Upon examining these reports, you will share my conclusion, I believe, that the activity they represent and the findings they contain deserve thoughful consideration by all who are charged with guiding the course of education in America today.

The directors of the Place Perception Project--James Blaut, David Stea, and George McCleary, Jr. --want all recipients of these materials to understand that they are "non-publications." Distribution at this time is meant to provoke thought and to stimulate discussion concerning young children as map readers and map makers.

I am assured by the project directors that your comments and suggestions would be most welcome. They should be addressed to

Mrs. Ann Bates, Executive Secretary
Graduate School of Geography
Clark University
Worcester, Massachusetts 01610.

Sincerely yours,

William D. Pattison
President

Appendix 6. Contents of Volume II.

PLACE PERCEPTION PROJECT :: SUPPLEMENT TO THE FINAL REPORT :: VOLUME II

PLACE PERCEPTION RESEARCH REPORTS

The reports bound in this volume are those which were prepared prior to September 30, 1971. Report No. 5 is a copyrighted dissertation, hence it cannot be included; copies are available from the Cartography Laboratory, Department of Geography, Clark University. Report No. 6 was in press on September 30, and is reproduced here in proof form. Report No.9 is to be a re-issue of the Final Report. Reports 10-14 are in in preparation.

Report Number	Author and Title
1.	J. M. Blaut,"Studies in Developmental Geography."
2.	David Stea, editor, "Working Papers in Place Perception". Articles by D. Stea, R. Bullock, J. Bloom, J. Blaut, C. Garside, M. Soergel, and M. Muir.
3.	Merrie Ellen Muir, "The Use of Aerial Photographs as an Aid in Teaching Map Skills in the First Grade."
4.	J. M. Blaut and David Stea, "Place Learning"
5.	Borden Dent, "Perceptual Organization and Thematic Map Communication" (not reproduced here: see explanation above).
6.	Roger Hart, "Aerial Geography: An Experiment in Elementary Education."
7.	Roger Hart and Gary Moore, "The Development of Spatial Cognition: A Review."
8.	Margaret Tindal,"The Home Range of Black Elementary School Children: An Exploratory Study in the Measurement and Comparison of Home Range."

Appendix 7. Contents of Volume III.

PLACE PERCEPTION PROJECT :: SUPPLEMENT TO FINAL REPORT :: VOLUME III

UBLICATIONS, MANUSCRIPT REPORT, AND PERCEPTUAL SURROGATES: CUMULATIVE FILE

This volume is a loose-leaf file of reprints, preprints, manuscripts, and visual materials developed by the Place Perception Project. As supplementary materials are received, they should be added to the file and logged.

FILE NO.	DESCRIPTION	PAGES
1.	Place Perception Project Bibliograghy, 1968-1971 (reproduced from PPP Final Report, Vol. I)	7
2.	J. M. Blaut and David Stea, "Studies of Geographic Learning."	7
3.	Merrie Ellen Muir and J. M. Blaut, "The Use of Aerial Photographs in Teaching Mapping to Children in the First Grade: An Experimental Study."	16
4.	David Stea and J. M. Blaut,"Some Preliminary Observations on Spatial Learning in Puerto Rican School Children."	15
5.	J. M. Blaut, G. F. McCleary, Jr., and América Blaut, "Environmental Mapping in Young Children."	15
6.	J. M. Blaut, "Space, Structure, and Maps."	4
7.	David Stea and J. M. Blaut, "Notes toward a Developmental Theory of Spatial Learning."	10

FILE NO.	DESCRIPTION	PAGES
8,	David Stea and J. M. Blaut, "A Toy-Play Test of Cognitive Mapping in Three- to Five-Year-Old Children."	5
9.	David Stea, "On the Metrics of Conceptual Space: Distance and Boundedness in Psychological Geogarphy."	11
10.	J. M. Blaut,"A Theory of Peasant Land-Use Behavior." (abstract)	1
11.	Jeremy Anderson and Margaret Tindal, "The Concept of Home Range: New Data for the Study of Territorial Behavior."	14
12.	L. S. Mark, "Modeling through Toy Play: Methodology for Eliciting Topographical Representations in Children."	21